May 2025 Issue 17

AquaEnergy Expo Magazine

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الهيئة السعودية للمياه
Saudi Water Authority

Towards a Sustainable Future: The Saudi Water Authority's Commitment to Innovation (SWA)

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Leads the way towards achieving Saudi Vision 2030

Falcon
Water Treatment Systems

Egypt for Water Treatment Systems: Pioneering Sustainable Water Solutions

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President of the Saudi Water Authority

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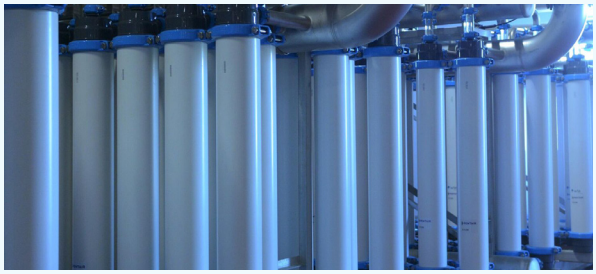

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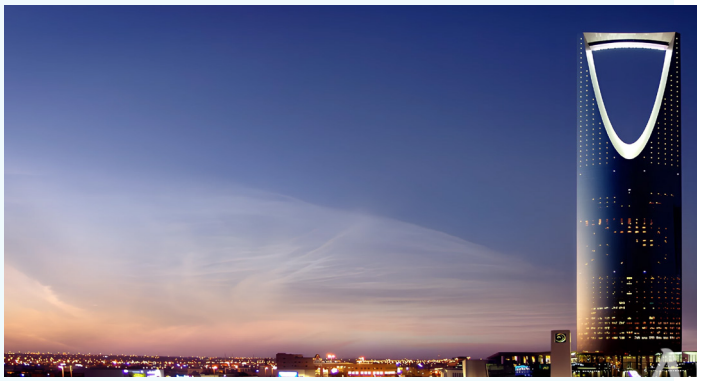

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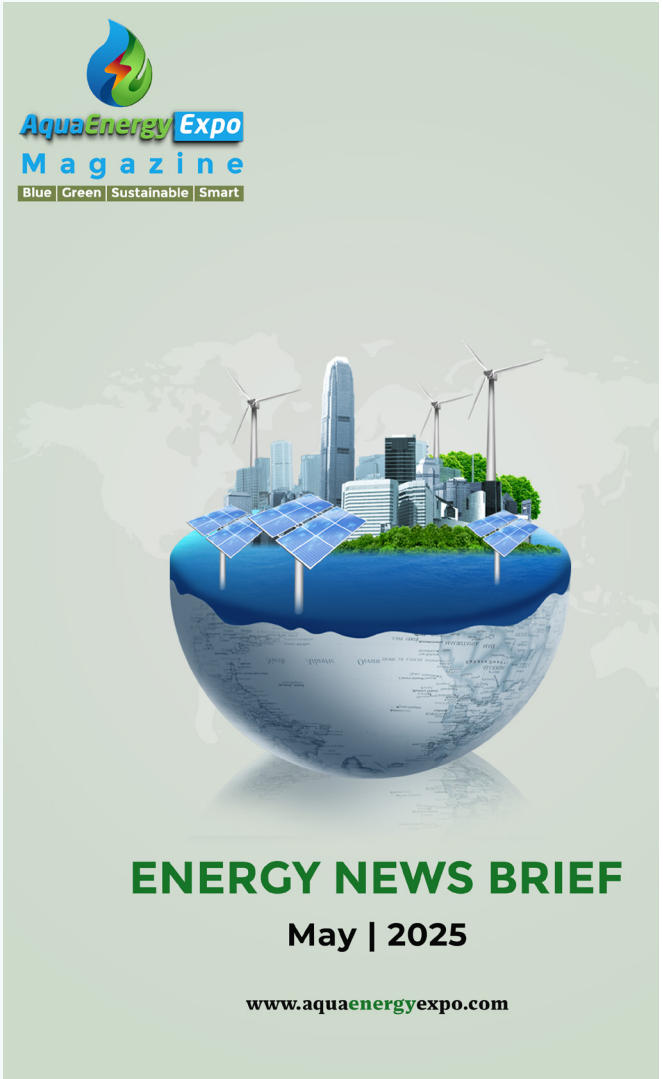

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Innovative Solutions to Achieve Sustainability in Water and Energy

From The Editor

In a world where water security is no longer a distant concern but a pressing global priority, the role of innovation, strategy, and sustainability in shaping water futures has never been more critical. This issue of Water & Sustainability Magazine is dedicated to exploring the remarkable advancements, pioneering solutions, and visionary leadership driving the transformation of the water sector—particularly across the Middle East and North Africa.

Our cover story, "Towards a Sustainable Future: The Saudi Water Authority's Commitment to Innovation," offers a compelling glimpse into how Saudi Arabia is proactively reshaping its water landscape. The Saudi Water Authority (SWA) stands at the forefront of this movement— leveraging technology, policy, and investment to secure water resources while aligning with the Kingdom's ambitious Vision 2030. Their efforts exemplify how national strategies can drive meaningful environmental impact and operational excellence.

This issue also spotlights industry leaders and breakthrough technologies pushing the boundaries of what's possible in water treatment and management. Filtralite® demonstrates how innovation in filtration media can significantly enhance energy efficiency and reduce costs in desalination processes—making sustainable water production more attainable and scalable.

From Egypt, Falcon Egypt for Water Treatment Systems continues to lead with purpose. Their commitment to delivering customized, sustainable water solutions has positioned them as a regional powerhouse—addressing complex water challenges with smart, forward-thinking systems designed for real-world impact. Equally inspiring is the role of the private sector in national transformation.

Al-Mousa Trading Co. exemplifies how strategic leadership and investment in modern water infrastructure are accelerating the realization of Vision 2030. Their contribution reflects a broader shift toward sustainability as a business imperative. We also turn our focus to technological innovation with Dupont, which highlights the advantages of ultrafiltration as a robust and effective pretreatment in seawater reverse osmosis systems. This technology not only boosts performance but also reinforces the long-term viability of desalination as a core water strategy.

ABB introduces a game-changing advancement in water quality monitoring. Their real-time wastewater analysis using UV/VIS technology revolutionizes how BOD and COD levels are tracked—delivering fast, accurate, and actionable data for better environmental compliance and resource management.

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Saudi Water Authority

Towards a Sustainable Future: The Saudi Water Authority's Commitment to Innovation

The Saudi Water Authority (SWA) plays a pivotal role in ensuring the Kingdom's water security through regulatory oversight, sustainable management of water resources, enhancement of service quality, strengthening of capabilities, promoting economic growth, fostering innovation and technology, and prioritizing environmental protection.

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Water security is a critical issue that many policies aim to address, ensuring its protection and preservation in the face of future challenges caused by today's global changes. The government has placed significant emphasis on safeguarding the Kingdom's water security as part of Saudi Vision 2030, recognizing it as a vital aspect of the nation's broader security framework. This commitment has led to the establishment of key indicators and targets, along with appropriate mechanisms to ensure the conservation and sustainability of water resources, particularly for drinking, for the benefit of future generations.

The Saudi Water Authority (SWA) plays a pivotal role in ensuring the Kingdom's water security through regulatory oversight, sustainable management of water resources, enhancement of service quality, strengthening of capabilities, promoting economic growth, fostering innovation and technology, and prioritizing environmental protection. This multifaceted approach adheres to phased responsibilities throughout the transformation process.

Leader in Water Sector Innovation

Saudi Arabia's remarkable transformation from one of the most water-scarce nations to the world's largest producer of desalinated water highlights its commitment to water security and sustainability. The Kingdom, once characterized by vast arid deserts, has achieved this feat through bold leadership, strategic innovation, and advanced technologies. The Saudi Water Authority (SWA) oversees the production of over 15 million cubic meters of water daily, managed by both public and private sectors, achieving world-leading efficiency in energy consumption and operational costs.

This water is transmitted through a sophisticated network spanning over 14,000 kilometers, ensuring effective delivery to distribution networks extending more than 135,000 SWA's strategic investment in next-generation technologies positions Saudi Arabia at the forefront of global water innovation. The Kingdom employs AI-powered desalination plants to enhance operational efficiency, integrates eco-friendly water transport systems to reduce environmental impact, and pioneers advanced anti-corrosion solutions derived from palm trees, extending critical water infrastructure lifespan.

Aligned with the Saudi Green Initiative, these advancements have led to a reduction of 37 million tons of carbon emissions annually since 2019. With a 65% local content ratio in desalination projects, SWA is driving economic development and creating high-skilled jobs, solidifying Saudi Arabia's role as a global hub for water technology and innovation.

Centre of Excellence

The establishment of the Saudi Water Innovation Center (WTIIRA) represents a significant step in fostering innovation, supporting entrepreneurs, and bolstering local businesses, particularly small and medium enterprises (SMEs). The center aims to align with Saudi Vision 2030 by localizing the manufacturing sector, increasing output, and creating job opportunities for Saudi youth. This initiative is part of broader efforts by SWA to enhance water security and achieve self-sufficiency in desalination products.

"Securing water is securing the future," said H.E. Eng. Abdullah bin Ibrahim Al-Abdulkarim, President of the Saudi Water Authority (SWA). "At SWA, we are not only building the world's most advanced water infrastructure but also redefining how nations approach water security. Our accomplishments in desalination, sustainability, and efficiency are not just for Saudi Arabia—they serve as a model for the world."

Key Areas of Focus for Technology and Innovation

The SWA has identified several key areas of focus to drive innovation in the water sector:

Extraction and Conversion

- Research is ongoing to extract valuable minerals from waste materials, turning potential pollutants into resources.
- Efforts are being made to convert waste into valuable products, promoting a circular economy.

Renewable Energy Integration

- The integration of renewable energy (RE) sources into water treatment processes is being prioritized to enhance sustainability.
- Development of clean energy solutions associated with desalination plants is crucial for reducing the carbon footprint.

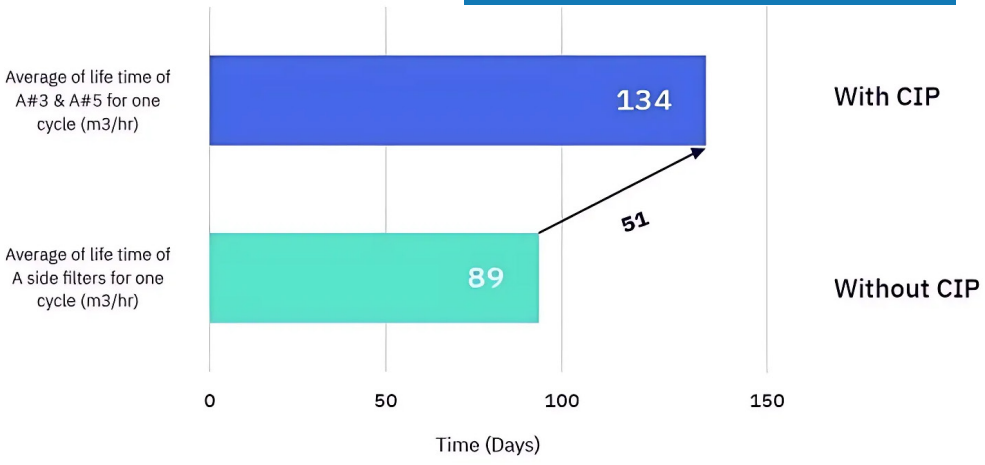
Efficiency Improvements

- Research groups are investigating ways to improve the efficiency of Seawater Reverse Osmosis (SWRO) systems.
- Various pretreatment technologies are being evaluated to optimize the desalination process.plants is crucial for reducing the carbon footprint.

Turning Innovation into Solutions

• Cleaning In Place (CIP) of Cartridge Filter

Cartridge filters (CF) are essential in the pretreatment systems of Seawater Reverse Osmosis (SWRO) desalination plants but often become contaminated, leading to increased operational costs and waste due to frequent replacements. To address this, the Water Technologies Innovation Institute & Research Advancement (WTIIRA) initiated a project to implement a Clean-in-Place (CIP) system at a SWRO plant in Yanbu. This system uses hydrochloric acid mixed with service water to clean CF vessels, significantly extending their lifespan and improving performance.



Following the success in the Arabian Gulf (RAS Al Khair), a similar CIP method is being tested in the Red Sea (Yanbu) on two filters. Each will undergo two CIP procedures tailored to the Red Sea's water composition, aiming for a 40% increase in filter lifespan and a 5% rise in filtered water output. Continuous monitoring and data analysis will assess the effectiveness, with plans to expand successful applications across the Red Sea region. This initiative highlights the commitment to adapt CIP processes to varying environmental conditions and enhance filtration efficiency.

• Techno-Economic Studies for Energy Recovery

This project focuses on a comprehensive study aimed at upgrading the RAK energy recovery system. By retrofitting with advanced pressure exchangers, the goal is to significantly boost efficiency, cut down on energy consumption, and achieve considerable cost savings. The current system operates with lower efficiency, resulting in elevated energy use and higher operational expenses. Our proposal suggests implementing state-of-the-art pressure exchangers, which promise a 25% reduction in energy usage. This upgrade is also expected to lower annual oil consumption by over 17,000 tons and cut CO_2 emissions by more than 55,000 tons.

The financial benefits of these modifications are substantial. With an estimated budget between $1.2 to $1.5 million per train, the investment could pay for itself within 4 to 5 years if fuel costs are subsidized.

However, if we consider the international cost of oil at 50 cents per kWh, the payback period could be shortened to less than 2 years. The modifications are projected to deliver annual savings of $3.4 million across all 16 trains.

• Brine Backwash Innovations

The Yanbu SWRO plant employs a conventional Dual Media Filter (DMF) backwashing system, where brine from the energy recovery device (ERD) is split into two streams. One stream fills a backwash water tank, while the other is discharged to the outfall. In the current setup, an orifice replaces the discharge valve, resulting in insufficient pressure to supply brine to the backwash tank, leading to the use of filtered water for backwashing instead. To improve this, installing a discharge valve would enable brine to be directed to the backwash water tank, making it the primary source for DMF backwashing.

This modification would allow the DMF to supply an additional 21,960 m^3/day of filtered water to the reverse osmosis (RO) system, enhancing operational flexibility and availability. Furthermore, adding an RO membrane could yield an extra 9,223 m^3/day of water production, assuming a 42% recovery rate.

• Membrane Fouling Mitigation via Osmotic Backwashing

Osmotic backwashing (OBW) is an eco-friendly membrane cleaning method primarily explored in laboratory settings. This research evaluated its effectiveness in fouling mitigation at a pilot plant level using a single-element reverse osmosis (RO) module for seawater desalination. After optimizing key OBW parameters, periodic backwashing was applied, resulting in notable improvements in membrane performance. Monitoring showed a lower feed channel pressure (FCP) drop of 50–100 kPa compared to 200 kPa in the control unit, a smaller decline in normalized permeate flow (10% vs. 30%), and minimal impact on salt rejection (99.5% vs. 99.2%). Foulant analyses indicated that the fouling layer on backwashed membranes was less dense and had lower inorganic content (~57% vs. ~72%). Overall, OBW effectively mitigated fouling and enhanced the performance of reverse osmosis membranes.

Innovative Water Circular Economy Solutions

The SWA is actively pursuing brine mining strategies that align with the circular economy. By utilizing desalination brine for the extraction of valuable minerals, the authority aims to generate substantial economic returns while promoting environmental sustainability. Innovative projects include:

• Production of Vaterite Calcium Carbonate

The Water Technologies Innovation Institute & Research Advancement (WTIIRA) is leading a groundbreaking project in Carbon Capture, Utilization, and Storage (CCUS), aligning with Saudi Arabia's Vision 2030 and its Circular Carbon Economy (CCE) initiative. The project addresses waste generated by the cement industry, specifically cement kiln dust (CKD), which is often landfilled.

Collaborating with Korean research teams, the pilot plant aims to assess the commercial viability of producing vaterite from desalination brine, CKD, and carbon dioxide. With a capacity of 50 tons per year, the plant can capture 22 tons of CO_2 annually. Vaterite calcium carbonate has diverse applications across industries such as paper, plastics, pharmaceuticals, and cosmetics, highlighting its potential as a high-value product that supports sustainability and economic growth.

• Sustainable Membranes for Brine Mining

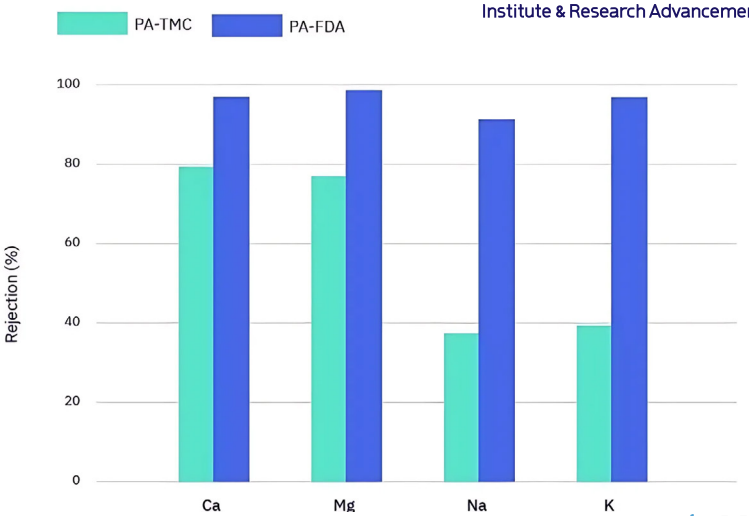
WTIIRA, in collaboration with King Abdullah University of Science and Technology (KAUST), is developing innovative nanofiltration (NF) membranes derived from renewable 'green' sources, such as waste biomass. Nanofiltration is essential for economically extracting commercially valuable products from desalination brine, and membrane technology is noted for its energy efficiency. However, current membranes for brine mining primarily rely on petrochemical-based materials produced using hazardous solvents, which contradicts the sustainability goals of Vision 2030 and the Saudi Green Initiative.

In this project, conventional fossil-fuel-derived monomers are being replaced with priamine (from vegetable oils) and 2,5-furandicarboxaldehyde (from plant biomass) to create effective NF membranes.

These membranes are being tested for ion rejection, water permeability, and resistance to fouling and degradation. Initial results suggest that bio-based NF membranes can match the performance of those made from typical commercial monomers.

> The investigation of separation factors and water recovery at pressures of 22.4 barg and 41 barg indicates that higher pressure could improve separation by up to 60% at the same recovery level.

A proposed new multistage nanofiltration configuration is projected to deliver 20% energy savings compared to the existing Shoiabah 4 multistage NF facility.



Transforming Waste into Value

The Saudi Water Innovation Center focuses on creating economic opportunities while promoting environmental sustainability. One of its key initiatives involves utilizing industrial waste as valuable economic resources. The center explores the potential of saline residue and carbon dioxide to produce microalgae, which are rich in proteins and natural pigments. This initiative targets the production of high-value products, tapping into lucrative global markets.

The global market for microalgae-derived animal feed is valued at $4.0 billion, while biofertilizers have a global market value of $2.6 billion. Additionally, the demand for beta-carotene pigment is estimated at $550 million.

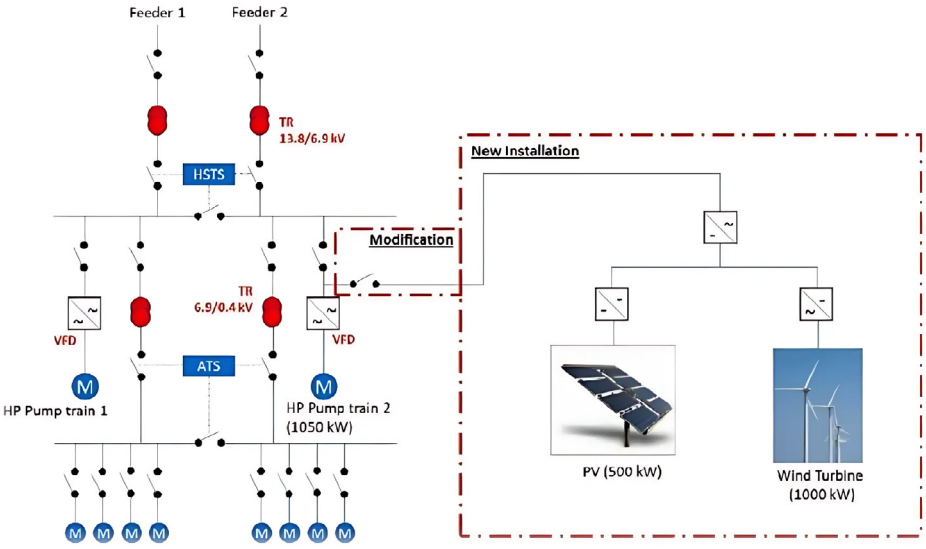
To achieve these goals, the project employs advanced technologies, including carbon dioxide-based extraction methods to obtain beta-carotene pigment. The microalgae produced contain over 40% protein, making them an ideal feedstock for various applications.

معهد ابتكـــار تقنيـــات المياه والأبحاث المتقدمة
Water Technologies Innovation Institute & Research Advancement
WTIIRA

Renewable Energy and Sustainability

The Haql Hybrid PV+Wind Renewable Project aimed to enhance renewable energy use in desalination plants by integrating a 1 MW wind turbine with 500 kW photovoltaic (PV) solar panels. This hybrid system provided renewable electricity to a high-pressure pump motor in a microgrid configuration, targeting over 60% renewable energy penetration annually and exceeding 90% in summer. Finalized in June 2024, the project spanned 12 months, achieving an average monthly renewable energy coverage of 64.8%. Located in the Haql area, known for its favorable wind conditions, the project utilized an Energy Management System (EMS) to monitor performance and ensure microgrid stability, effectively compensating for variations in energy supply and demand.

Additionally, WTIIRA, the research arm of the Saudi Water Authority, has launched a project to extract pure hydrogen from chlorination processes, aiming to reuse it as a sustainable energy source. The project seeks to improve chlorine production efficiency by utilizing byproducts and promoting a circular economy. Key outcomes include innovative hydrogen purification technologies that lower operational costs and produce hydrogen more economically. Additionally, the initiative maximizes industrial byproduct utilization, reduces waste, and enhances environmental sustainability, ultimately contributing to reduced carbon footprints and supporting renewable energy goals in the industrial and water desalination sectors.



AI-Powered Solutions in Desalination Technologies

The Saudi Water Authority highlight the deployment of Artificial Intelligence (AI) technologies in desalination operations, showcasing their ability to tackle critical challenges, optimize processes, and drive innovation. These initiatives reflect Saudi Arabia's commitment to advancing AI in alignment with Vision 2030, aiming to enhance efficiency, reduce costs, and improve sustainable water management for future generations A prominent example is the Khaybar Purification Unit, located 318 km from the Yanbu desalination plant, which faced significant operational challenges.

Future Directions

Collaboration is crucial for achieving the ambitious objectives outlined by the Saudi Water Authority. The SWA actively partners with a range of stakeholders, including academic institutions, private sector firms, and international research organizations. These alliances are vital for fostering innovation, exchanging knowledge, and developing advanced technologies that tackle water management issues. Saudi Arabia's leadership also extends beyond its borders. The Kingdom is promoting international cooperation for water security by:

- Hosting the World Water Forum in 2027, establishing Saudi Arabia as a global leader in water security solutions.
- Creating the Global Water Organization, which promotes international collaboration and policy innovation.

Falcon Egypt for Water Treatment Systems: Pioneering Sustainable Water Solutions

Water scarcity is one of Egypt's most pressing challenges, exacerbated by population growth, industrial demand, and climate change. In this critical landscape, Falcon Egypt for Water Treatment Systems (WTS) has emerged as a leader in providing innovative and sustainable water treatment solutions. Founded in 1998 by Professor Dr. Mohamed Fikry, an internationally recognized expert in water treatment technologies, the company has expanded its operations across Egypt, delivering high-quality chemical treatments, filtration systems, and wastewater management solutions.

This article explores Falcon Egypt WTS's history, mission, scope of work, and contributions to Egypt's water security, alongside the country's national water management strategy.

Company History: Growth and Expansion

Falcon Egypt WTS began in 1998 as an agent for American Falcon International WTS, a globally recognized chemical company based in Florida, USA. Initially specializing in water treatment chemicals for industrial applications, the company quickly expanded its services to include:

- Steam & hot water boilers
- Cooling towers & chilled water systems
- Reverse osmosis (R.O.) desalination plants
- Wastewater and sewage treatment plants
- Filtration systems (sand, carbon, softeners)
- Delivering industrial chemicals
- Delivering test nits dosing pumps and measurement devices
- Delivery all type of filtration and softening systems such as Sand, carbon, green sand fitter and softeners with all sizes.

To serve Egypt's industrial hubs, Falcon Egypt WTS strategically opened multiple branches:

- Minia (2008) – Covering Upper Egypt (Beni Suef, Assiut, Sohag)
- Alexandria (2010) – Serving Borg El Arab, Nobaria, Kafr El Dawar
- Mansoura (2014) – Covering Delta governorates
- Port Said (2016)– Supporting the Suez Canal industrial zone

Today, Falcon Egypt WTS serves industries such as fertilizers, cement, plastics, textiles, and airport, while also addressing environmental challenges through wastewater treatment plants and regulatory compliance.

Visionary Leadership: Professor Dr. Mohamed Fikry

At the heart of Falcon Egypt WTS is Professor Dr. Mohamed Fikry, an esteemed consultant with over 35 years of experience in water treatment technologies. His expertise spans boiler water treatment, cooling towers, reverse osmosis (R.O.), and wastewater management.

Dr. Fikry has authored more than 15 international research articles published in leading journals, contributing significantly to advancements in water treatment science. His vision for Falcon Egypt WTS was to establish a company that not only provides cutting-edge solutions but also aligns with Egypt's long-term water security goals.

> **"Our leadership in water chemistry since 1998 stems from solving the industry's most complex challenges. Customer confidence is earned through relentless problem-solving—whether in a 10 m³/hr pilot plant or a 1,000 m³/hr industrial system, "Prof. Dr. Mohamed Fikry, expressed**

This predictive capability allows for proactive maintenance, preventing costly and disruptive water main breaks. Moreover, Fracta's AI system continually learns and improves over time, enhancing its predictive accuracy as more data is integrated. This success underscores AI's transformative potential in traditional industries, demonstrating that it can deliver tangible benefits and drive innovation.

Securing Egypt's Water Future: Challenges and Strategic Solutions

Egypt faces a significant water management challenge, requiring an estimated $900 billion by 2037 to ensure water security for sustainable development. The country needs 114 billion cubic meters (BCM) of water annually, mainly for agriculture, but currently receives only 60 BCM from the Nile and groundwater. This shortfall will likely increase due to the Grand Ethiopian Renaissance Dam and climate change. The Minister of Water Resources and Irrigation has called for substantial long-term investments in water infrastructure, advanced farming techniques,

Prof. Dr. Mohamed Fikry
Chairman of Board of Directors

and improved drainage systems. The national water plan aligns with the 2030 Vision and involves nine ministries focusing on key areas:

• Water Purification and Recycling

This includes managing industrial effluent. In 2015, indirect reuse of wastewater in the Nile Delta was 9.31 BCM, with a target of increasing this to 16.26 BCM by 2037. However, high contaminant levels in untreated wastewater led to the closure of several mixing pump stations, preventing the reuse of approximately 2.37 BCM per year. To address this, the government is upgrading wastewater treatment from secondary to tertiary levels, incorporating sand filtration and chlorination to enhance water quality.

• Rationalizing Agricultural Water Consumption

The government aims to reduce water loss through advanced irrigation techniques and the use of water-efficient seeds. Traditional flood irrigation practices lead to significant evaporative losses and soil damage. Initiatives include promoting smart irrigation and lining irrigation canals to minimize water infiltration losses.

• Increasing Water Resource Availability:

New projects such as coastal desalination plants and rainwater harvesting systems are planned. By 2030, the government aims to boost water resources by 1.5 BCM through desalination, with plans to double this by 2037. Additionally, expanding collaboration with Nile Basin countries is a priority.

Falcon Egypt WTS: Comprehensive Water Treatment Solutions

Falcon Egypt WTS is a leader in industrial and municipal water treatment, offering end-to-end solutions to optimize efficiency, sustainability, and regulatory compliance. Our expertise spans:

- The intersection of artificial intelligence (AI) andSteam & Hot Water Boilers– Advanced chemical treatments to prevent scaling, corrosion, and microbial contamination.
- Cooling Towers– Customized solutions for scale inhibition, biofouling control, and water conservation.
- Chilled Water Systems– Antifreeze and corrosion protection for HVAC and industrial cooling applications.
- Wastewater & Sewage Treatment– Design, construction, and operation of treatment plants (1–1000 m^3/hr), including tertiary filtration and disinfection.
- Reverse Osmosis (R.O.) Desalination – Brackish and seawater treatment systems (1–1000 m^3/hr) for industries and municipalities.
- Equipment Supply – Dosing pumps, R.O. spare parts, and automation systems.
- Filtration Systems – Water softeners, sand filters, and activated carbon filters for purification.
- Treatment Media – Cationic/anionic resins, mixed beds, anthracite, gravel, and specialty activated carbon.
- Testing & Monitoring– Chemical test kits, digital analyzers, and on-site water quality assessments.
- Consultation & Training– Feasibility studies, system audits, and operator training for sustainable water management.

By integrating cutting-edge technology with decades of expertise, Falcon Egypt WTS ensures reliable, cost-effective, and eco-friendly water solutions tailored to Egypt's evolving needs.

Proven Industry Expertise

Falcon Egypt WTS has a strong track record in delivering high-performance water treatment solutions for leading industrial clients across multiple sectors. Their successfully executed projects include:

- Steam Boilers – Serving Nile for Oils and Detergents (a major player in manufacturing), Al-Majid Group (fertilizers), and 480+ industrial companies, ensuring efficient heat exchange and corrosion prevention.
- Cooling Towers – Optimizing systems for Foodico (food industry), Cairo Airport (Terminal 3), and 58+ facilities to enhance water efficiency and reduce scaling/biofouling.
- Chilled Water Systems– Implementing solutions for Vacancies Institute, Egypt Gardens (food processing), and 81+ sites, ensuring stable cooling operations with minimal water waste.
- Reverse Osmosis (R.O.) Stations– Custom desalination plants for Al-Tounsy Plast Group, Vienna Cosmetics, Luna Cosmetics, and 65+ clients, providing high-purity water for industrial processes.
- Wastewater Treatment – Designing and building treatment stations (1–1000 m^3/hr) for international firms like Naturub Egypt (Sri Lanka), Plaza Garments (India), Polymer Plast(Syria), and 50+ Egyptian companies, ensuring compliance with environmental standards.

With cross-sector experience and scalable solutions, Falcon Egypt WTS combines engineering precision with sustainable practices to meet diverse industrial water challenges.

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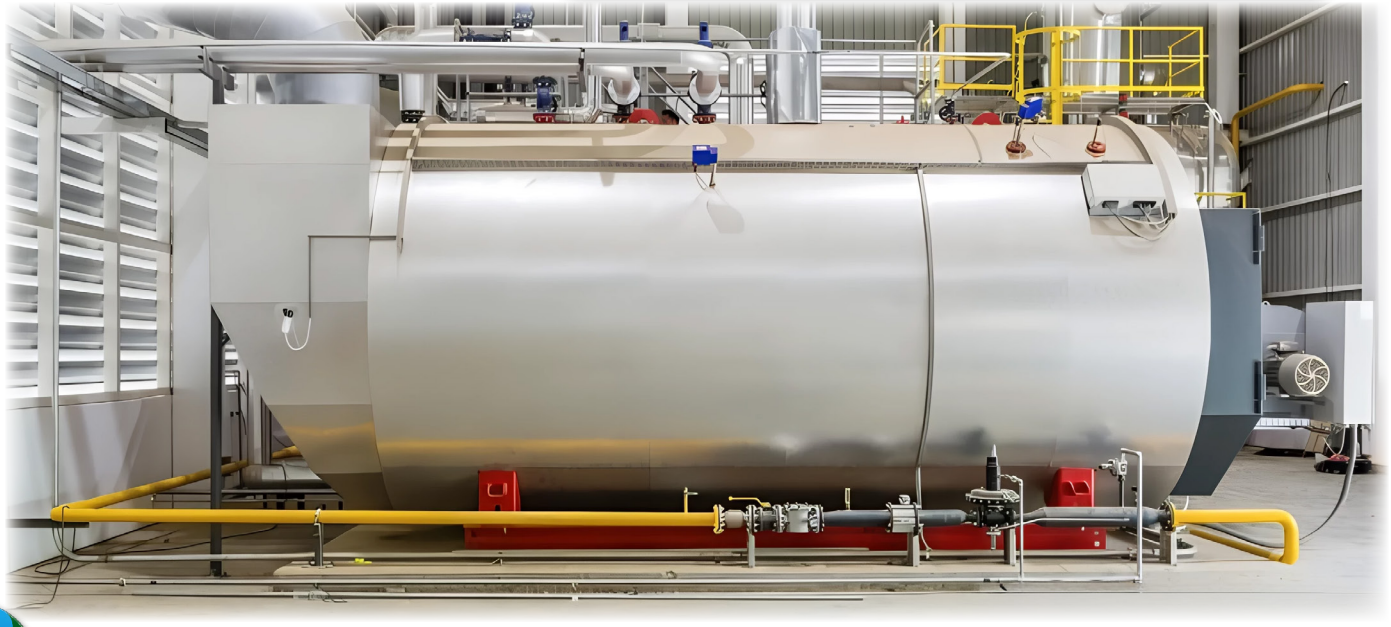

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Filtralite®: Enhancing Energy Efficiency and Cost-Effectiveness in Desalination

Filtralite® filter media reduces the amount of water taken from the environment and the cost of running the desalination plant

Algeria, like other countries around the world, is facing increasing problems in managing its water resources. The country already has 14 seawater desalination plants, with a further 5 under construction. In order to cope with this new technology, which requires specific skills, the country is also launching a training and scientific research program in 4 of the country's universities.

The 5 new, larger plants currently under construction will increase the amount of desalinated water produced by Algeria from 17% to 42%

They will, also, make more water available for agriculture. The water situation in Algeria is characterised by major challenges. The country, located in an arid and semi-arid region, faces limited water resources and frequent drought conditions. In Algeria, water availability per person is relatively low, which poses challenges not only for drinking water supply but also for agricultural irrigation and industry. Water resources used to come mainly from rainfall, groundwater, and dams.

However, rainfall is irregular and groundwater recharge is limited. In response, the Algerian government has introduced policies and programmes to improve water management, such as the construction of new dams and the expansion of drip irrigation. Yet problems of access to quality drinking water remain a reality for some rural and remote regions. It is in this climate of widespread scarcity of water resources that Algeria is raising awareness of the need to conserve water, while at the same time looking for new outlets.

Desalination is therefore part of this development strategy chosen by the government. Desalination plants play an essential role in diversifying sources of drinking water in Algeria, particularly in coastal areas where fresh water is scarce. They help to improve drinking water supplies for local populations.

Desalinating seawater requires major investment in terms of infrastructure and energy. It is against this backdrop that the solution offered by Filtralite® filter media is an interesting one for reducing the amount of water taken from the environment and the cost of running the plant.

Mr Mohamed Chaffi

Director of the Beni Saf Desalination Plant

The Beni Saf desalination plant can produce up to 200,000 m3/day. It belongs to the Beni Saf Water Company and is operated by Tedagua. It is one of the largest water desalination plants in the Mediterranean. Filtralite® was implemented in the plant in two stages: 24 filters in October 2020 and the rest in October 2021.

The first replacement in 2020 enabled a comparison of filters with Filtralite® versus sand. In recent years, Algeria's coastal zone has experienced frequent episodes of high rainfall, resulting in high levels of suspended matter in the raw water. This suspended matter is mainly of mineral origin and is causing difficulties in the production of drinking water and an increase in operating costs. To improve the situation, while minimising investment, the sand in the first filtration stage, 48 filters, was replaced with Filtralite®. The primary objective was to reduce rack downtime when TSS levels are high and to optimise operating costs by reducing the frequency of backwashing. In addition, this change of media improved the quality of the filtered water and reduced pressure drops.

Production losses for the same period, from November 2019 to February 2020, have been compared with those for 2020-2021. Production losses fell from 673,000 m3 to 380,000 m3: a reduction of 45%. With the replacement of the remaining 24 filters, it is expected - based on 2020 data - that the reduction in production losses will be 85%. As well as being a highly competitive scenario, replacing sand with Filtralite® reduces production losses due to frequent backwashing, cuts the water needed for backwashing, and optimises operating costs - energy, cartridges, chemical cleaning, O&M.

Desalination plants play an essential role in diversifying sources of drinking water in Algeria, particularly in coastal areas

Can you present your career, your current role, and your degree of involvement in the Beni Saf project?

Mr Chaffi Mohamed, General Manager of Benisaf Water Company Spa, a joint venture between Grupo ACS and AEC Spa. I am an engineer in urban hydraulics and I have been working in the seawater desalination sector since 2008. As General Manager of BWC Spa since 2014, I have participated in several improvements in the plant including the change of the filtration sand by Filtralite®.

Can you give us a few figures on the characteristics of your plant? What solutions did you have for the filtration stage before the installation of Filtralite®?

The Beni Saf seawater desalination plant has been in operation since 2010 and has produced a total of 830 million cubic metres as of 31 December 2022. Prior to the installation of Filtralite®, the plant's process used filter sand.

"I learned about Filtralite® during a professional event. The characteristics of the product and the advantages offered attracted my interest"

Replacing sand with Filtralite® reduces production losses, cuts the water needed for backwashing, and optimises operating costs

How did you hear about the Filtralite® solution? What made you decide to take the plunge into this innovative filtering media? What barriers did you eventually encounter during this project?

I learned about Filtralite® during a professional event with Baptiste Rogeau at WEX Lisbon 2016. The characteristics of the product and the advantages offered attracted my interest in this product. At that time, I found a barrier regarding the product's marketing certificate as it was not yet used in seawater desalination plants, but on the other hand the advantages were numerous. So, we decided to invest in the Filtralite® filter media and certainly no regrets.

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What problems justified the choice of Filtralite® media? Were you able to solve these problems with Filtralite®?

The problem encountered in the pre-treatment of the plant is the suspended solids (SS) which are limited by the process to 25 mg/l which obliges us to stop the plant to secure the equipment. We were able to partially solve this problem by increasing the SS limit to 40 mg/l with Filtralite® corresponding to a more than 62.5% increase on our rates.

Were you able to discover any unexpected results, positive or otherwise?

The results are positive because, since the installation of the Filtralite®, we have far exceeded this initial process limit. We have even continued to produce, partially, with SS reaching a level of 70 mg/l in 2022.

How would you describe the main aspects of Filtralite® and its advantages over your original solution?

The main aspects of Filtralite® are:

- Reduction of washing sequences
- Operation with SS above 25 mg/l
- Energy saving

Do you have any idea how much energy you are saving with the Filtralite® solution? What would be your estimated return on investment? Could you give us more details on this calculation?

The amount of energy saved in the pre-treatment area is estimated at around 10%. It is thousands of dollars we can save every year. Our estimated return on investment is 4 years due to the increase in the SS limit.

If you had to do it all over again, would you choose the Filtralite® solution? Would you recommend it to your colleagues?

Yes, I would do it again with pleasure. I have already recommended it to other stations.

What are the next projects in your factory?

Our next projects are the certification of our integrated system with the ISO 9001/ISO 45001/ISO 14001/ISO 50001 standards, the installation of 11 variable speed drives, and the installation of solar panels on all the factory's roofs to produce 1.5 MWp.

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ABB: Real-Time Wastewater Quality Monitoring – The Future of BOD/COD Analysis with UV/VIS Technology

Wastewater quality can change rapidly, especially due to industrial discharges, leading to shock loads in treatment systems. This can result in increased chemical and aeration demands, as well as potential regulatory compliance issues if wastewater is not treated effectively. Monitoring Biochemical Oxygen Demand (BOD) early in the treatment process allows for the detection of industrial discharges, optimization of chemical addition for incoming COD/BOD, improved clarifier performance, and reduced non-compliance risks. As challenges related to organic loading evolve, ongoing research and technological advancements are crucial for sustainable water management.

ABB, a leader in measurement solutions, has enhanced its capabilities through the acquisition of Real Tech, launching the UviTec™ product family. This innovation marks a significant advancement in optical-based water quality monitoring, delivering rapid and accurate analysis of BOD and Chemical Oxygen Demand (COD). ABB's BOD/COD monitoring systems offer continuous online measurement, allowing for the early detection of shock loads in wastewater, enabling proactive treatment adjustments to prevent non-compliant effluent.

What is Organic Loading in Wastewater Treatment?

Industrial discharges can introduce high levels of organic material and other contaminants into the wastewater stream. When such discharges occur, the quality of incoming wastewater to a municipal treatment plant can change abruptly, leading to unexpected shock loads. These events can disrupt normal plant operations, resulting in treatment challenges, increased operational costs, and, in some cases, a decline in effluent water quality.

To mitigate the effects of shock loading, wastewater treatment plants (WWTPs) may operate with a buffer, but this approach often leads to elevated operational expenses. A more effective and cost-efficient solution for managing shock loads is the continuous monitoring of key water quality parameters, such as biological oxygen demand (BOD) and chemical oxygen demand (COD). This monitoring provides early warnings of industrial discharge events and offers proactive information to enhance treatment processes.

Lab Testing for Organics = Delays & Missed Opportunities

BOD and COD are very useful water quality parameters for wastewater treatment operations. Unfortunately, these labor-intensive laboratory tests take hours to days to generate results, creating a significant delay. When results are received from the lab, the information is usually of litter value for event detection purposes or process control. This delay presents a missed opportunity for operators to detect events when they occur and adjust or optimize their treatment system accordingly.

• Biochemical Oxygen Demand (BOD)

BOD assesses the amount of dissolved oxygen consumed by microorganisms in a sample. This measurement is crucial for understanding how much oxygen is required to break down organic material, which significantly impacts operational costs for wastewater facilities. BOD measurement involves two steps:

1. An initial measurement of dissolved oxygen.
2. Incubating the sample for 3-5 days, followed by a final measurement of dissolved oxygen. The difference indicates the oxygen consumed by microorganisms during the incubation.

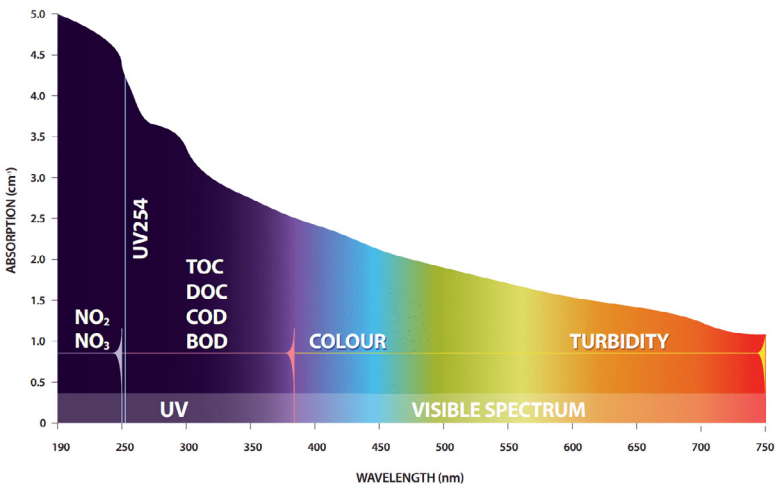
• Chemical Oxygen Demand (COD)

COD quantifies the total oxygen demand of organic compounds in wastewater. In COD testing, a strong oxidizing agent is used under acidic conditions to convert organic species into CO2. After oxidation, the remaining oxidizing agent is measured, typically through titration. This process takes about 2-3 hours and is less affected by heavy metals or toxic compounds compared to BOD, providing a reliable measure of organic content expressed in mg/L.

Real-time Actionable Information

The UviTec™ real-time BOD/COD monitoring systems are advancing how wastewater is managed. The systems provide far superior data both spatially and temporally by continuously analyzing the water onsite, as opposed to laboratory testing methods which analyze small volumes that are widely spread over time. This allows the WWTP to quickly identify events that would otherwise go unnoticed, better monitor discharge trends, and provide much greater control capabilities.

The innovative UviTec BOD and COD sensors leverage patent-pending proprietary technology for exceptional measurement accuracy across various wavelengths of light using UV LEDs. Numerous compounds, including organics, absorb light within the UV-VIS spectrum. These sensors assess organics in a multi-dimensional manner, leading to improved correlations with water quality parameters such as BOD, COD, and TOC. ABB provides both submersible UviTec BOD/COD probes and bypass sensor options, allowing you to choose the best fit for your requirements.



• UviTec BOD/COD Sensor

The UviTec bypass BOD/COD sensor offers an economical solution for real-time measurement of organic content in water or wastewater. Utilizing UV LEDs across various wavelengths, this sensor delivers exceptional measurement accuracy. It is designed for diverse monitoring applications and features multiple sensor path lengths to achieve the desired measurement range.

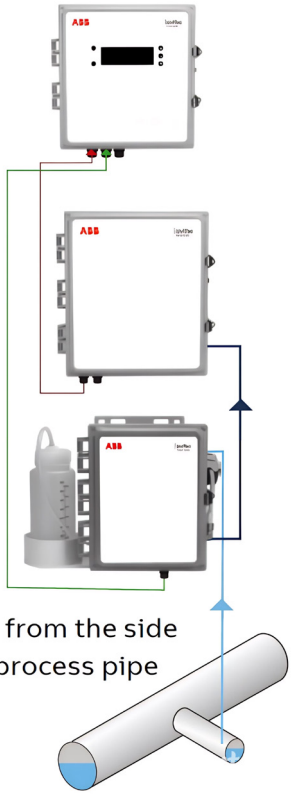
Benefits:

- Automatic chemical cleaning
- Capability to monitor two streams with a single sensor
- Various configurations available, including side stream closed loop, high pressure, and high solids.

This cabinet-style instrument can be mounted on walls, railings, or system backboards. It requires a pressurized sample source or can use an open-channel system with an accessory pump. A UviTec controller is necessary for operation.

Example Configuration

- UviTec Controller: Designed for cost-effective and user-friendly operation and control.
- BOD/COD Sensor: Provides real-time, continuous measurement of BOD and COD organics.
- UviTec Clean System: Ensures low-maintenance automatic cleaning.



• UviTec BOD/COD Probe

The robust submersible probe is designed for real-time organic matter measurement in challenging environments, available in titanium or stainless steel. It also employs patent-pending technology for superior performance across multiple wavelengths.

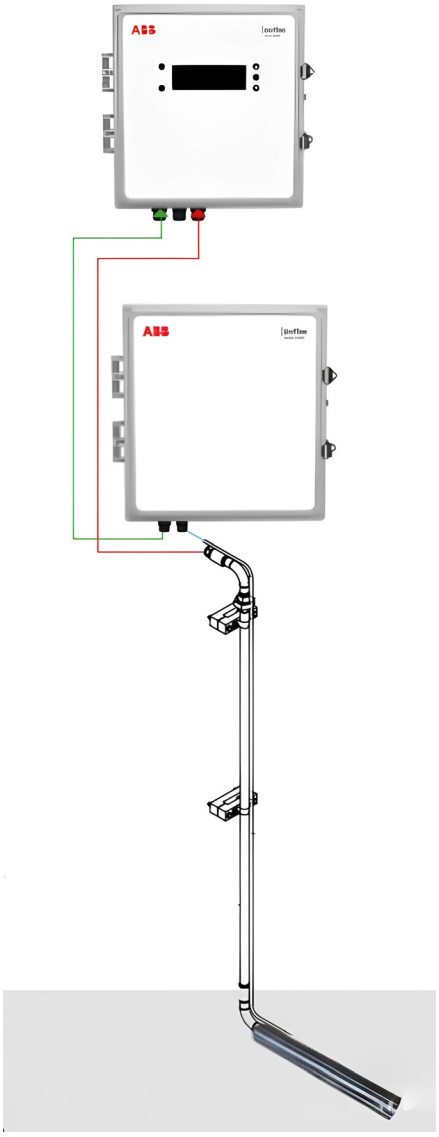
Benefits:

- Automatic cleaning using compressed air or pressurized water
- Suitable for outdoor installations
- Compact design with chain or pole mounting options.

Ideal for open channel applications, UviTec's BOD/COD probe is a submersible instrument installed directly in-situ. The BOD/COD probe must be connected to a UviTec controller for operation.

Example Configuration

- UviTec Controller: Offers an affordable and user-friendly solution for operation and control.
- Probe Clean System: Provides low-maintenance automatic cleaning.
- Mounting Kit: Ensures secure attachment to a tank, open channel wall, or railing.
- BOD/COD Probe: Delivers real-time, continuous measurement of BOD and COD.



Spotting Water Quality Problems Early: The Benefits of Continuous Monitoring

Continuous monitoring of BOD and COD provides the earliest indication of a shock load entering the plant. This vital information not only helps prevent the operational challenges that can arise from undetected events but also equips the operations team with actionable insights to adjust the plant's operational parameters, ensuring compliance with effluent standards.

Real-time data on organics allows for the optimization of chemical addition in the primary clarifier or aeration tank. By dosing chemicals according to current water quality conditions, operators can ensure that sufficient chemicals are added to meet treatment objectives while avoiding excessive dosing. This optimization helps reduce costs associated with these expensive treatment aids, particularly during critical events, while maintaining the desired effluent quality.

Additionally, similar optimization can be applied in aeration basins, allowing operators to increase the aeration rate during high-load events to enhance treatment or decrease it during low organic load scenarios to save energy and costs.

The Role of Liquid Ai™

The Liquid Ai™ platform offers a comprehensive suite of services aimed at enhancing water quality monitoring. The Liquid Ai platform can provide 4 fundamental services:

• Liquid Ai Remote Monitoring

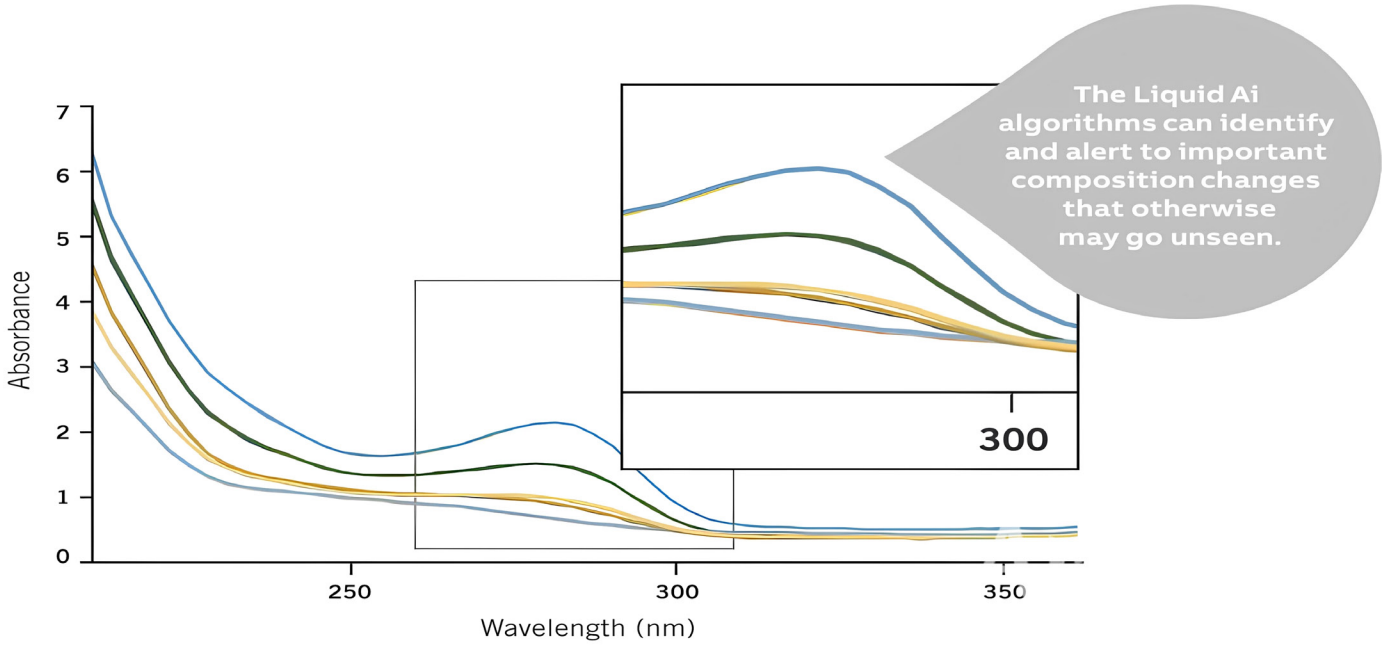
This service provides flexible data access through various channels, including a web-based platform, text and email alerts, and integration with SCADA or PLC systems. Users can monitor sensor data anytime, anywhere, with a secure online interface that includes a visual map of device locations and customizable dashboards.

• Liquid Ai Calibration Health

This ongoing service ensures the monitoring system delivers reliable data. It actively detects changes in water quality that may affect calibration performance, allowing for continuous improvements. Custom calibrations become more effective over time, adapting to the specific conditions of the monitored water.

• Liquid Ai Anomaly Detection

The Liquid Ai® platform offers an Anomaly Monitoring service for real-time detection of unusual events that may go unnoticed by existing parameters. This service provides valuable insights into contaminants and events, enhancing plant operations. By improving real-time intelligence, it supports better decision-making and operational efficiency for plant managers.



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DuPont: Advantages of Ultrafiltration as Pre-treatment for Seawater Reverse Osmosis

Over the past 15 years, DuPont ultrafiltration modules have emerged as a leading choice for Engineering Companies and End-users seeking the lowest cost of water. Committed to high-quality standards and manufacturing excellence, these modules cater to industrial and municipal water applications. Proper pretreatment for Reverse Osmosis (RO) systems is crucial for producing high-quality feed water and ensuring sustainable operations.

Recently, hollow fiber Ultrafiltration (UF) technology has gained traction as an effective pretreatment for seawater desalination, offering advantages like better handling of fluctuations and high solid loads, a smaller footprint, and consistent water quality. This technology enhances environmental sustainability and reduces long-term water costs.

Supported by over a century of material science expertise and extensive experience in the water industry, DuPont provides exceptional value through its ultrafiltration modules and complementary products.

Ultrafiltration and DuPont™ IntegraTec™: A New Era in Water Technology

Ultrafiltration (UF) is a key purification process that effectively separates particulate matter from soluble compounds using ultrafine membranes. It plays a crucial role in desalination pretreatment, reverse osmosis, and wastewater reclamation, contributing to potable water production. DuPont has introduced the DuPont™ IntegraTec™ Integrated Ultrafiltration Technology Portfolio, merging three leading brands—inge®, MEMCOR®, and DuPont™—to leverage over 35 years of industry expertise

The IntegraTec™ portfolio combines proven products with innovative solutions, featuring a simplified naming structure. Built on 90 years of collective water technology experience, IntegraTec™ offers a comprehensive range of filtration solutions tailored to various challenges. The portfolio includes Pressurized and Submerged ultrafiltration modules with PES and PVDF membranes, ensuring optimal performance for specific applications.

IntegraTec™ emphasizes the integration of ultrafiltration systems with downstream processes, enhancing flexibility, scalability, and efficiency. With support from a global team of experts, IntegraTec™ serves as a one-stop-shop for water technology, providing advanced manufacturing processes and robust solutions to meet diverse filtration needs. This new brand unites heritage and innovation, positioning DuPont at the forefront of the water industry.

Ultrafiltration: An Overview

Delta Power is striving to become a leader in the water treIn ultrafiltration, water and low-molecular-weight substances are driven through an ultrafine membrane under pressure, creating a flow by establishing a pressure gradient between the membrane's outer and inner walls. The feed pressures typically range from 4 to 100 psig, with most systems operating below 30 psig, while the transmembrane pressure is generally kept under 14 psig for optimal performance.

Ultrafiltration membranes feature pore sizes between 0.02 and 0.05 microns, which allows for the effective removal of bacteria, viruses, colloids, and silt, thus producing high-quality water suitable for various applications. However, it's important to note that ultrafiltration does not reject smaller particles such as dissolved salts or organics, nor does it effectively eliminate true color, taste, or odor from the water.

These membranes typically have a service life of three to seven years, with the potential for even longer use depending on operating conditions and maintenance. They are commercially available in multiple configurations, including hollow fiber, tubular, plate and frame, and spiral wound designs, offering versatility to meet diverse water treatment needs across different industries.

High-Performance and Energy Savings

DuPont's ultrafiltration modules are designed with high-strength, hollow-fiber membranes that deliver exceptional performance. Key features include:

- A nominal pore diameter of 0.03 µm, ensuring effective removal of bacteria, viruses, and particulates, including colloids.
- High-strength PVDF polymeric hollow fibers that provide excellent chemical resistance.
- Hydrophilic PVDF fibers that enhance wettability and ease of cleaning, contributing to long-term performance.
- An outside-in flow configuration that accommodates a wide range of feed solids and supports air scour cleaning.
- U-PVC housings that eliminate the need for pressure vessels and are resistant to UV light.

The outside-in flow design is adaptable to various feed water qualities and facilitates air scour cleaning. The dead-end flow configuration enables higher recovery rates and energy efficiency. The pressurized vertical shell-and-tube design negates the requirement for separate pressure vessels and simplifies air removal during cleaning and integrity testing.

The hollow fiber ultrafiltration membranes have an outside diameter of 1.3 mm and an inside diameter of 0.7 mm, made from PVDF polymer.

Their strength stems from the combination of PVDF polymer, an asymmetric membrane with smaller pores in the active filtration area, and a high-porosity substructure. PVDF membranes exhibit high chemical resistance, including chlorine, and can withstand temperatures up to 40°C.

Selection of SWRO Pretreatment: UF vs. DMF

The choice between Dual Media Filtration (DMF) or Ultrafiltration (UF) as the pretreatment for seawater reverse osmosis (SWRO) systems depends on the specific project/site

conditions and how they align with the selection criteria. There is no one-size-fits-all solution, and the optimal pretreatment technology will depend on evaluating these different factors for the given application.

The selection criteria are divided into the following categories:

- Economics / Total Cost of Water
- Compactness / Low Footprint
- Pretreatment Impact on RO Biofouling Development
- Availability / Robustness (TSS, Algae, Oil)
- Sustainability Metrics
- Optimized Operation and Performance

Here are the key advantages of Ultrafiltration (UF) versus Dual Media Filtration (DMF) for seawater pretreatment in reverse osmosis (RO) systems include:

1-UF can reduce the cost of water and total ownership costs by 17-51% during the pretreatment phase compared to DMF.

2-UF requires a smaller footprint, achieving reductions of 52-69% compared to DMF.

3-UF provides comparable RO performance to DMF even in high-algae seawater conditions.

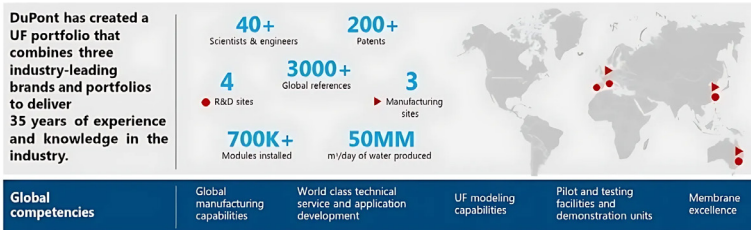
4-UF demonstrates greater resilience to feed water contaminants than DMF.

5-DuPont's IntegraTec™ ultrafiltration modules offer enhanced robustness and plant availability relative to other UF products.

6-UF effectively manages occasional spikes in feed water contaminants like TSS, O&G, and algae while still adhering to warranty standards for RO feed.

7-Additionally, UF results in 89% lower CO_2 emissions compared to 2-stage DMF, attributed to waste reduction, decreased chemical use, and a smaller environmental footprint.

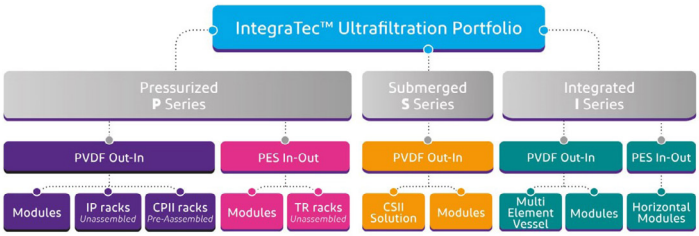
Why choose DuPont™ IntegraTec™ Ultrafiltration solutions?



DuPont™ IntegraTec™ Ultrafiltration solutions stand out for several compelling reasons:

- **Deep Expertise and Capabilities:** With extensive knowledge in water treatment, DuPont is dedicated to delivering exceptional customer success.
- **Comprehensive Solutions:** IntegraTec™ serves as a one-stop shop for a variety of ultrafiltration needs, ensuring tailored solutions for diverse applications.
- **Proven Effectiveness:** The company has a track record of providing reliable solutions exactly where they are needed.
- **Beyond Products:** DuPont's expertise extends beyond mere prod uct offerings; they tackle complex challenges with membrane technology excellence.
- **Durable Configurations:** The range of module and rack configurations is both reliable and durable, designed to withstand demanding conditions.
- **World-Class Manufacturing:** DuPont maintains high standards in ultrafiltration manufacturing and quality control.

The IntegraTec™ ultrafiltration portfolio includes several series, each tailored to specific application requirements:



- **Pressurized P Series**

PVDF (Polyvinylidene Fluoride) Out-In: Offers high fouling resistance, excellent oxidation resistance, and high recovery rates with minimal backwash needs. Its diverse fiber designs enhance adaptability.

PES (Polyethersulfone) In-Out: Features low energy consumption with high permeability, exceptional mechanical strength through a 7-bore capillary design, and tight pore structures for effective virus rejection.

- **Submerged S Series**

PVDF Out-In: Ideal for retrofitting conventional filter basins, this series boasts high solids handling capacity, low total cost of ownership, and a compact footprint, especially beneficial for large plants. It allows for direct coupling to reverse osmosis (RO) systems, with scalability of up to 44 modules per rack.

- **Integrated I Series**

PVDF Out-In Multi-Element Vessels: Designed for outdoor installation with minimal civil investment, these vessels are compact, easy to maintain, and scalable. They offer high pressure ratings and low energy consumption.

PES In-Out Integrated Horizontal Modules: These modules are perfect for retrofits and upgrades, featuring various sizes with a high active area and robust Multibore® fibers.

Global Adoption and Success Stories

• Maspalomas-I desalination plant, Spain

DuPont's solutions have been instrumental in addressing complex water challenges across diverse industries and regions, from industrial applications to municipal water supply systems. One notable example of DuPont's impact is its role in the Spain's largest Maspalomas-I desalination plant in Gran Canaria. This facility, designed by Elmasa Tecnología del Agua S.A., employs pressurized ultrafiltration as a pretreatment method to address the increasing demand for potable water in the Canary Islands. With over 12 million annual visitors, Gran Canaria faces freshwater scarcity due to its surrounding seawater and low rainfall. The plant's capacity has been expanded to process 14,500 cubic meters per day, necessitating the construction of a new open intake system due to limitations of the existing beach wells.

> "After a 10-month pilot trial, the IntegraPac™ Ultrafiltration system was selected for its ability to produce 32,250 m³/d, offering higher recovery rates and lower lifecycle costs compared to conventional sand filters."

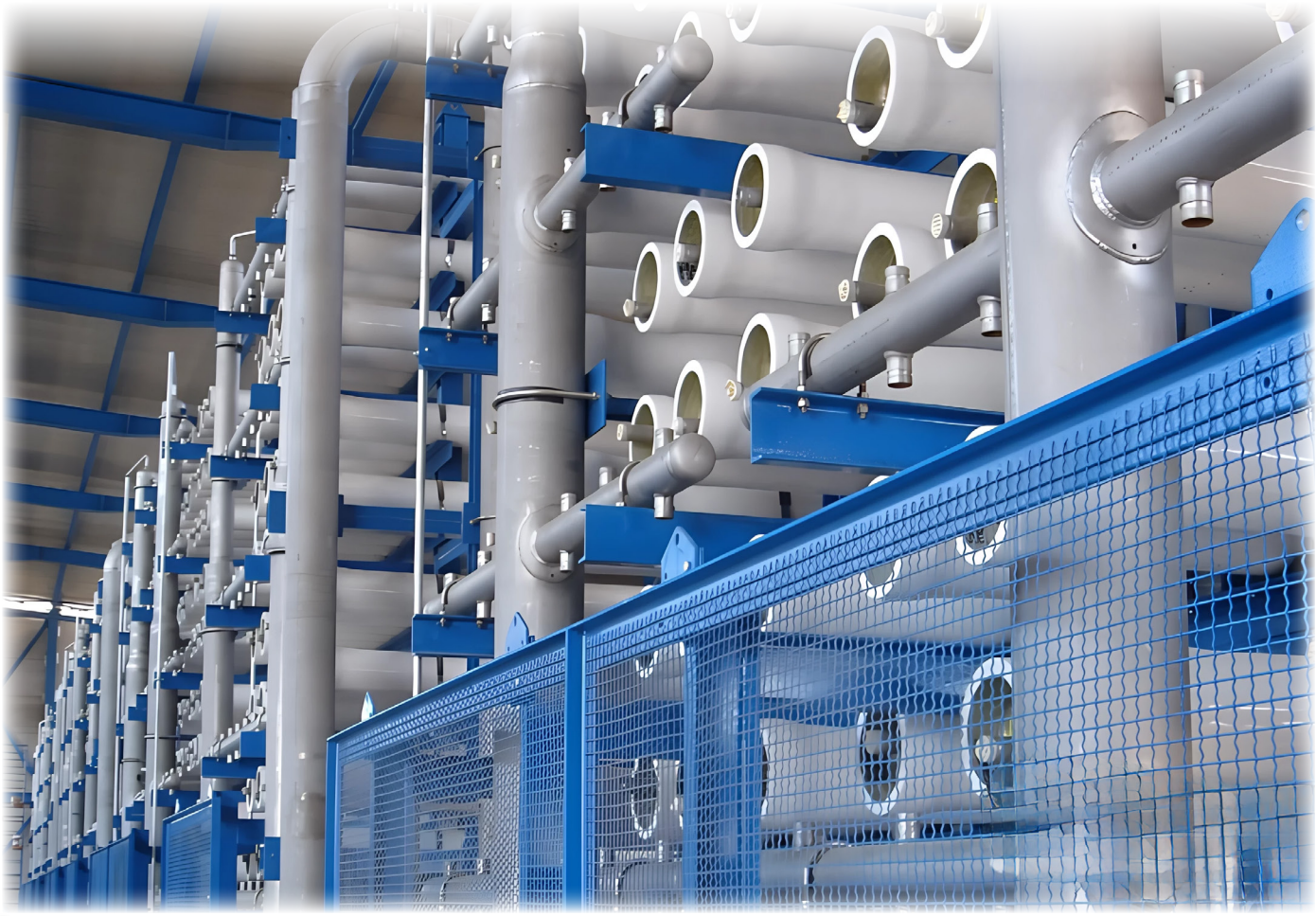
This technology simplifies design and installation, reducing costs and space requirements. The advanced Polyvinylidene fluoride (PVDF) hollow fiber technology ensures high performance across various feed water conditions, making it a critical component for the efficient operation of Maspalomas-I.

• Jazan, Saudi Arabia

DuPont's technologies have also been pivotal in other parts of the world, such as the PES In-Out Ultrafiltration System in Jazan, Saudi Arabia.

The Jazan Refinery supplies 105,000 cubic meters of pretreated seawater daily for desalination to the Saudi Aramco IGCC Complex, using a mix of seawater and treated wastewater.

To ensure high-quality feed water, nine pressure-optimized ultrafiltration T-Rack™ systems with patented Multibore® membranes from inge® GmbH deliver a continuous flow of 4,380 m³/h. Since commissioning, the plant has achieved a 94% recovery rate, demonstrating the robustness of PES ultrafiltration membranes against feed water irregularities, making it an effective solution for reliable pretreatment in industrial applications.



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info@al-mousagroup.com

Al-Mousa Trading Co. Leads the Way Towards Achieving Saudi Vision 2030

In order to ensure its protection and preservation in the face of upcoming challenges brought on by today's worldwide changes, water security is a crucial issue that various policies seek to address. As a key component of the country's larger security framework, the government has given protecting the Kingdom's water security a lot of attention as part of Saudi Vision 2030. In order to guarantee the preservation and sustainability of water resources for the benefit of future generations, important indicators and targets have been established, along with suitable systems. While adhering to phased responsibilities throughout the transformation process, the authority's regulatory oversight, sustainable management of water resources, improvement of service quality, strengthening of capabilities, promotion of economic growth, innovation and technology, and prioritization of environmental protection all reflect its crucial role in ensuring the Kingdom's water security.

Al-Mousa Trading Co, whose primary operations provide simple and reasonably priced access to water, is one of the key private sector entities driving this endeavor. It has profited from the Vision's emphasis on prudent water management while collaborating closely with the government.

Thriving Under Vision 2030

As a member of the Al-Mousa Group, which was established in 1960 as a supplier of deep well pumps made abroad and has since expanded to include ten businesses, including Sadan Saudi Water and Energy Company and National Water Works Company, Al-Mousa Trading Company was impacted by Vision 2030, which has made it much bigger and more significant for its operations than it was initially anticipated when it was first announced in 2016. Over the previous five years, the total number of employees has doubled to 240, and an additional 100 hires are anticipated in 2025.

> **"Our revenue has reached about $800 million a year, and since King Salman and Crown Prince Mohammed bin Salman have made the water industry a major component of Vision 2030, we believe the business will do much better in the years to come," says Group CEO Eng. Saleh Alhlafi.**

> **Since water initiatives in the Kingdom are expected to cost over $10 billion a year for the next five years, our businesses that are participating in many of these projects will undoubtedly prosper.**

Partners of Success

Collaborating with its partners, Al-Mousa Trading Co, the group's main company dealing with water production and related activities, supplies all water pumps and accessories types, as well as some other water products for a variety of applications in the public and private sectors. In addition to pumping systems, the company also delivers advanced thermal systems such as boilers, calorifiers, and solar water heaters, and high-quality piping solutions including PPR, HDPE, PEX, and acoustic systems for residential, commercial, and industrial projects.

For the benefit of its customers, it also provides comprehensive product services and maintenance facilities. The company has recently stocked a large inventory of submersible pumps up to 120kW, further strengthening its position as a key distributor of Grundfos in Saudi Arabia.

This initiative is aimed at saving valuable time for its customers by ensuring they have immediate access to high-quality, high-performance, and reliable pumping solutions that meet the demands of critical applications. Thus, as a trusted partner of Grundfos, Al Mousa Trading Co. is committed to offering top-tier solutions that support Vision 2030's sustainability and innovation goals.

In addition to being recognized by Grundfos as an Excellence Distributor for 2024, Al-Mousa Trading Co. is an authorized partner and trusted distributor of Peerless Pump, a global leader in fire protection pump systems. Moreover, the company has delivered high-performance, sustainable water treatment solutions across the region through partnering with Filtralite®. Through this strategic partnership, It's enabled to get more efficient biological treatment, physical filtration, and tertiary water treatment using advanced materials like:

Filtralite® Clean and Filtralite® Pure filter media which are designed to meet the highest standards in both biological treatment and physical filtration. Engineered with a unique porous structure and made from lightweight expanded clay, these solutions maximize filtration efficiency, enhance biofilm growth, and reduce operational costs - all while enabling larger volumes of water to be treated effectively. Together with other several partners, those are contributing to a cleaner, more sustainable future, aligned with Saudi Vision 2030 and global environmental goals.

Case Study: Successful Witness Test for GRUNDFOS Water Pumps at Riyadh Facility

A comprehensive witness test for GRUNDFOS water pumps was recently conducted at a specialized facility in Riyadh, as part of the ongoing Arar University Project. The testing session included the active participation of the project consultant, the main contractor, and the end user, ensuring transparency and alignment with all stakeholder expectations. During the session, several critical technical parameters were thoroughly verified to confirm compliance with the project's performance requirements. The pumps demonstrated full capability in meeting the specified flow rate and head, reflecting strong hydraulic performance and suitability for the application.

Efficiency was carefully assessed, with results confirming that the pumps deliver optimal energy performance, ensuring long-term reliability and cost-effective operation. Power consumption was monitored in kilowatts to verify that each pump operates within the expected energy usage limits, contributing to efficient power management across the system. Electrical performance was also examined, with both amperage and voltage readings falling within the required range. This confirms the pumps' alignment with the electrical standards of the project and ensures safe, stable operation under all expected conditions. The Net Positive Suction Head (NPSH) was also tested and measured in feet, with the results showing excellent suction handling capabilities, eliminating the risk of cavitation. Moreover, vibration levels were recorded and found to be minimal, indicating smooth and quiet mechanical performance. Additionally, the pumps' revolutions per minute (RPM) were confirmed to be consistent with design specifications, ensuring sustained and reliable operation.

The successful completion of this witness test represents a key milestone in the Arar University Project. It confirms that the selected GRUNDFOS pumps are fully capable of delivering the required performance standards and operational stability. This achievement stands as a testament to the quality of equipment selected for the project and to the rigorous verification process followed to ensure excellence at every stage.

Al-Mousa Trading Co. is not just navigating change—it is helping to shape the future of water infrastructure in Saudi Arabia and beyond.

Al Mousa Trading's Strategic Role in 2030 Projects

> "Whether they are utilized for HVAC, firefighting, residential applications, housing projects, or irrigation, we are solution providers for some of the most renowned water pump manufacturers worldwide," says company CEO Lu'ay Altoussi. "You can see that we are involved in many of the projects under Vision 2030 that are being developed by the government's Public Investment and that we call "high-connect" projects."

These massive projects, such as NEOM, King Salman Park in Riyadh, and Red Sea, are supplied by Al Mousa Trading Company. By 2030, Global, a collection of upscale, ultra-luxury resorts, hopes to rank among the world's most popular travel destinations.

Al-Mousa's revenue nearly doubled to $32 million last year from about $8 million three years earlier. Outside funding undoubtedly contributed to this expansion, and the business strives to keep expenses low, which pleases the banks and allows it to grow gradually but steadily.

The Right Team, The Right Vision

Notwithstanding this success, there have been difficulties in recent years, beginning with the COVID-19 pandemic's consequences and most recently the conflict in Ukraine. Although there have been difficulties along the way, Altoussi contends that a business is similar to a successful football club in that having the appropriate players on board is essential if you want to win.

> "We need to invest in a new department, and now is the time to do this because the market is booming and the government is so supportive," Altoussi says, adding that the company's next goal is to generate more than $135 million in revenue annually.

Microsoft: The Future of Sustainable, Water-Free Data Centers

The growing demand for cloud computing and data storage has significantly increased the construction of data centers, which have a considerable impact on the environment. These facilities consume large quantities of energy, often derived from non-renewable sources.

Additionally, the water required for cooling these centers presents another significant environmental challenge. Microsoft is at the forefront of developing next-generation data centers that eliminate the need for water in cooling, aiming to achieve water positivity by 2030. This initiative is part of the company's comprehensive sustainability strategy.Starting in August 2024, Microsoft introduced a new data center design that optimizes AI workloads while using zero water for cooling. In this article, we will explore the challenges posed by data centers, how Microsoft's innovative design addresses these issues, and whether this approach could be crucial in making data centers more environmentally sustainable.

The Challenges of Datacenter Cooling

Data centers are the often-overlooked champions of the digital era, serving as the foundation for cloud computing and artificial intelligence technologies that have transformed our lifestyles and work environments.

As the demand for online services and data processing grows, the significance of data centers is increasingly apparent. Nevertheless, the enormous energy demands of these facilities present a significant challenge, especially for those who value environmental sustainability.

The energy crisis affecting data centers is an urgent issue, with many developers struggling to fulfill their power needs. Some are even investigating alternative energy sources, like nuclear power, to secure a dependable and steady electricity supply. While this strategy may tackle the availability of power, it fails to consider the environmental repercussions of data centers.

Environmental Consequences of Energy Use

Environmental advocates have consistently criticized the energy consumption habits of data centers, often associated with non-renewable sources. The reliance on air conditioning systems to cool these facilities necessitates additional energy, usually derived from fossil fuels. This not only adds to greenhouse gas emissions but also continues the dependence on non-renewable energy sources. Moreover, the use of air conditioning centers can lead to heightened energy consumption, further worsening the environmental footprint of these facilities.

Water cooling is another technique some data centers utilize to regulate their temperature. Although this method may appear more eco-friendly, it brings its own challenges.

Impact on Local Ecosystems

The significant volumes of water needed for cooling can severely impact local ecosystems. The release of heated water into adjacent water bodies can disturb the natural equilibrium of aquatic life, resulting in deteriorating water quality and potentially endangering local fauna.

Furthermore, using water for cooling can strain local water supplies, particularly in regions already facing water shortages. Evaporative cooling is yet another strategy some data centers adopt to alleviate heat generation. However, this method has its own downsides. The water loss from evaporation during cooling processes is not compensated by the data center, leading to the depletion of nearby rivers and water sources, which can create arid environments and worsen ecological degradation. Additionally, evaporative cooling requires significant energy to function, further contributing to the environmental challenges faced by data centers.

Innovative Technologies

A 2024 report revealed that Microsoft's water consumption for its data centers surged to 6.4 million cubic meters, up from 4.7 million cubic meters the previous year, coinciding with a 34% increase in energy use. By 2027, global AI demand could withdraw 4.2 to 6.6 billion cubic meters of freshwater—nearly half the amount consumed by the entire UK. To address these challenges, innovative cooling technologies are essential to Microsoft's water strategy, leading to rapid expansion of proven solutions across its data center portfolio.

One notable technology is cold plates, a direct-to-chip cooling method that efficiently dissipates heat in a closed-loop system. Cold plates cool silicon directly and recirculate the cooling fluid, akin to a car radiator, significantly enhancing cooling efficiency and temperature control compared to traditional air cooling. Microsoft is developing new data center designs optimized for direct-to-chip cooling, which requires rethinking server and rack layouts for improved thermal and power management. Innovations

Azure Maia AI Accelerator chips, drawing heat from the cold plates. Additionally, advancements in microfluidics integrate tiny fluid channels into chip designs, allowing coolant to be embedded directly within the silicon. These developments enable precise temperature control and higher rack capacity while consuming zero water for cooling, significantly reducing water usage and enhancing compute power within data centers.

Keeping it cool: Microsoft's new approach to cooling

In August 2024, Microsoft introduced a data center design specifically optimized for AI workloads that eliminates the need for water in its cooling systems. The company's innovative chip-level and closed-loop liquid cooling technologies allow for precise temperature control without depending on water evaporation. By focusing on chip-level cooling solutions, Microsoft not only promotes environmental sustainability but also addresses the increasing demand for high-performance data infrastructure.

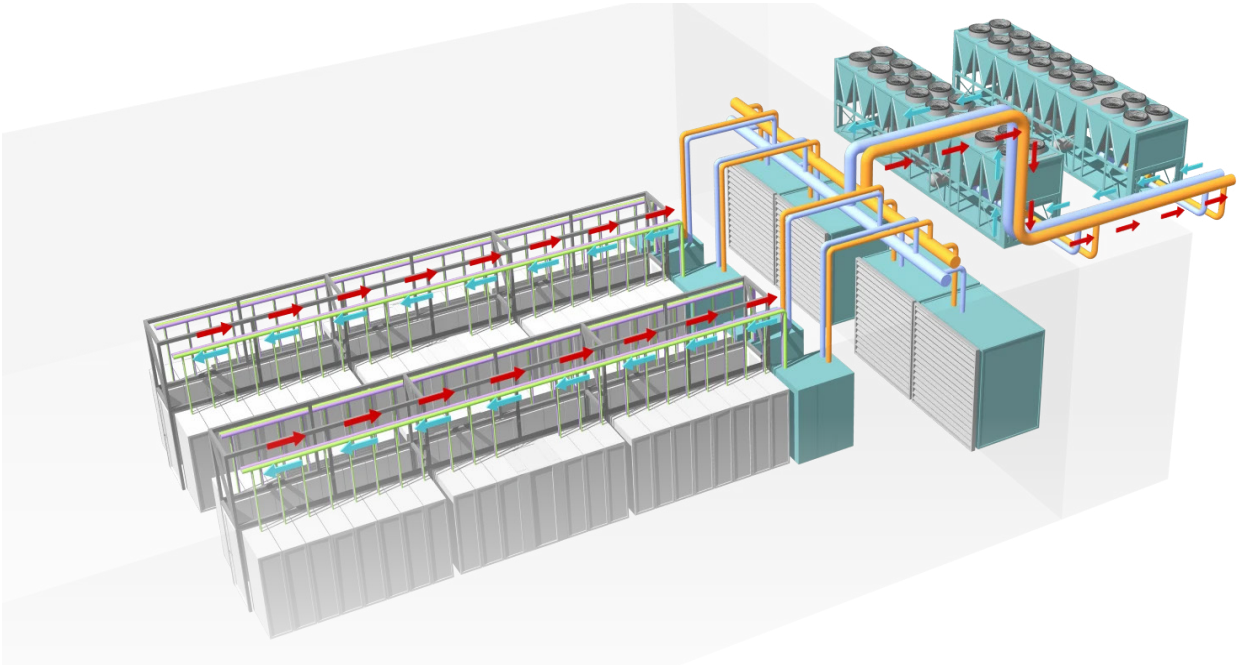
This advancement could significantly influence industry standards for resource-efficient technology development.

Through the implementation of closed-loop liquid cooling, Microsoft can effectively recycle water between servers and chillers, drastically reducing the need for freshwater. While some water remains necessary for administrative tasks, this design change is expected to save over 125 million liters annually per data center. As water scarcity becomes an escalating global concern, this transition aligns with both environmental goals and regulatory requirements for corporate responsibility.

> "These innovative liquid cooling technologies are designed to circulate water within a closed system," states Steve Solomon, Vice President of Data Centre Infrastructure Engineering at Microsoft. "Once the initial setup is complete, the system operates autonomously, efficiently dissipating heat without requiring additional water intake, he adds."

Improving Water Usage Effectiveness (WUE)

Microsoft's new liquid cooling technologies utilize a closed-loop system that continuously recycles water between servers and chillers,



eliminating the need for a fresh water supply once filled during construction. Water efficiency is measured through Water Usage Effectiveness (WUE), which calculates total annual water consumption for cooling and humidification against total energy consumption for IT equipment. In the last fiscal year, Microsoft achieved an average WUE of 0.30 L/kWh, a 39% improvement from 2021's average of 0.49 L/kWh. This reduction is attributed to efforts to minimize water waste, expand operating temperature ranges, and conduct audits of data center operations.

Additionally, Microsoft has increased its use of alternative water sources, including reclaimed and recycled water, in locations such as Texas, Washington, California, and Singapore. Since the early 2000s, the company has worked to reduce water use, achieving an 80% improvement in WUE since the introduction of its first-generation data centers.

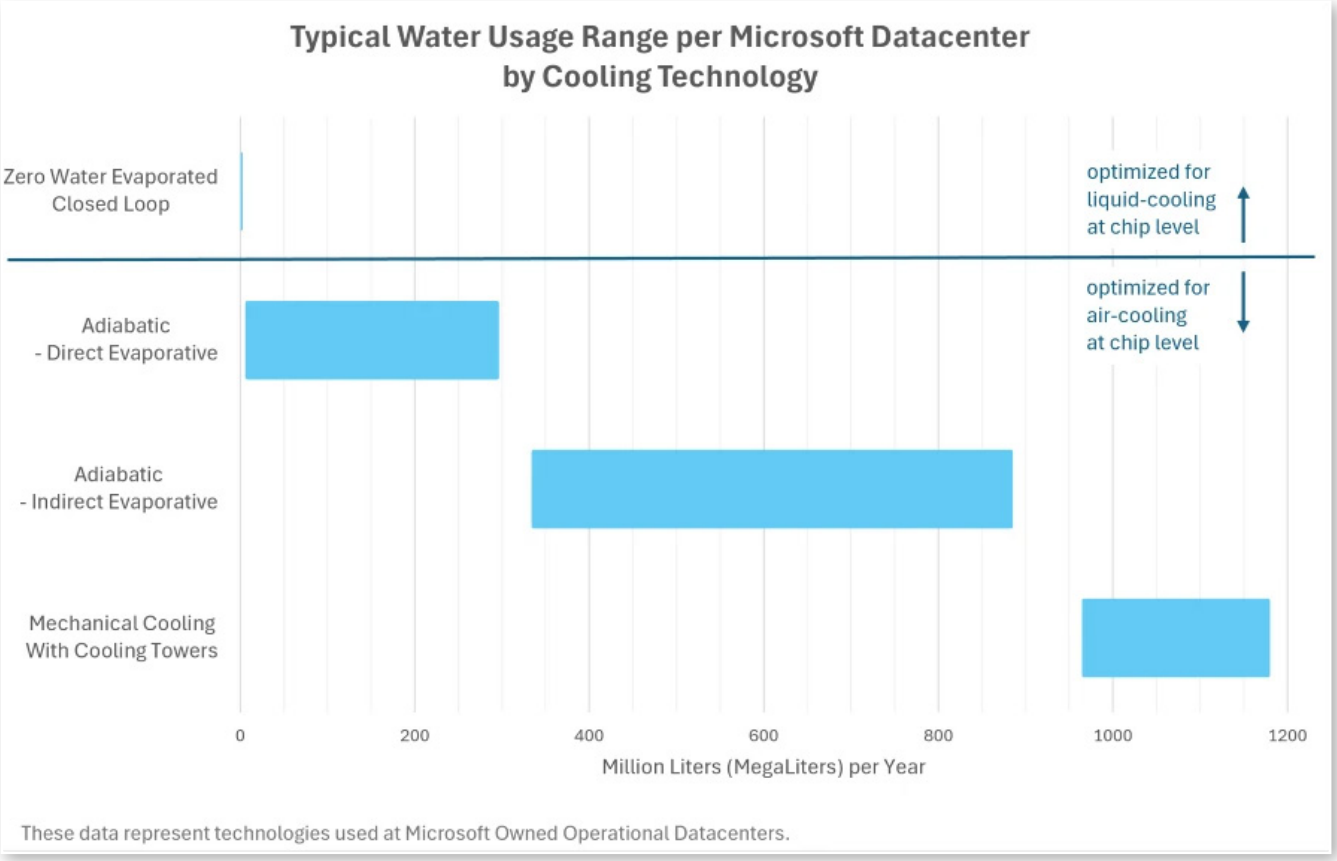
As water scarcity becomes a more pressing issue, the transition to next-generation data centers is expected to bring WUE close to zero for facilities utilizing zero-water evaporation cooling.

Contributing to a sustainable future

Microsoft is making significant strides toward sustainability with ambitious plans for water conservation. By 2026, pilot projects in Phoenix, Arizona, and Mt. Pleasant, Wisconsin, will test zero-water cooling systems, aiming for full implementation by late 2027. Starting in August 2024, all new Microsoft data centers will adopt this innovative cooling technology, setting a new industry standard.

The company is also reducing its reliance on freshwater through various conservation efforts and alternative water sources. In regions facing high water stress, localized solutions like rainwater harvesting and wastewater recycling help mitigate environmental impacts.

Additionally, Microsoft has committed to replenishing more water than it consumes globally by 2030. This involves investments in various water restoration initiatives, such as watershed conservation and municipal leak detection. A notable partnership with FIDO, an AI-driven leak detection company, helps prevent water loss



Microsoft collaborates with local governments and water agencies to enhance infrastructure projects that improve water accessibility and strengthen community resilience. Looking ahead, the company aims to further develop its water-efficient technologies, expand its replenishment initiatives, and advocate for sustainable water policies, reinforcing its commitment to environmental stewardship.

Can Closed-Loop Systems Revolutionize the Way We Manage Data Center Resources?

Closed-loop cooling systems present significant advantages for data centers but also face notable challenges. A key issue is the need for chip-level cooling, as modern server processors are smaller yet generate higher temperatures, necessitating a complex network of tiny pipes and heat exchangers within server designs. This complexity can lead to increased costs and risks, such as potential damage to server racks from leaks or blockages in water lines, which can result in costly repairs and downtime.

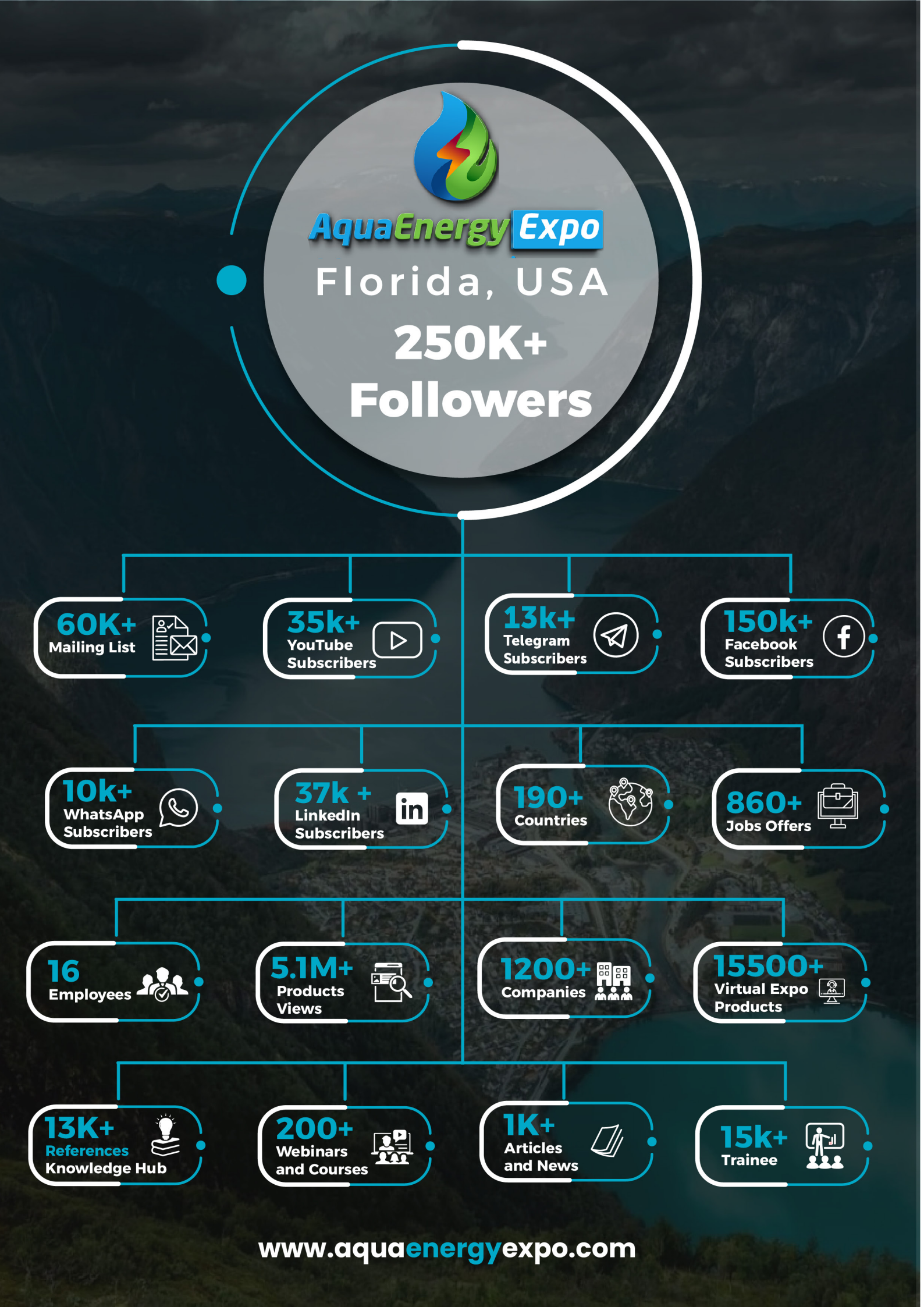
Another challenge is the energy required to cool water without evaporation, which can be energy-intensive and may raise overall energy consumption. If this energy comes from non-renewable sources, it could undermine the environmental benefits of the cooling system by contributing to greenhouse gas emissions. However, using renewable energy sources like solar or wind can help reduce the carbon footprint of data centers.

Despite these obstacles, closed-loop cooling systems hold promise for lessening the environmental impact of data centers. To maximize their effectiveness, it is crucial to address the challenges of chip-level cooling, ensure system reliability to prevent server damage, and responsibly source energy. If these issues are resolved, closed-loop cooling systems could significantly advance the sustainability of the data center industry, aligning technological progress with environmental responsibility.

Conclusion

In conclusion, Microsoft is leading the charge toward sustainable data center operations by implementing innovative cooling technologies that eliminate water usage. By launching a new design in August 2024 that utilizes chip-level and closed-loop cooling systems, the company aims to optimize AI workloads while significantly reducing its water footprint.

Despite challenges such as the complexity of chip-level cooling and the energy demands of these systems, Microsoft's commitment to sustainability remains unwavering. By focusing on renewable energy sources and advanced water conservation strategies, Microsoft is not only addressing immediate environmental concerns but also setting a benchmark for the future of eco-friendly data centers.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Energy-Efficient and Durable: The Best Submersible Pumps in the Market Today

In today's world, submersible water pumps are vital for residential, industrial, agricultural, and wastewater applications. These mechanical devices operate underwater, efficiently transporting water, sewage, and other fluids from wells, drainage systems, and flooded areas. Featuring a hermetically sealed motor closely coupled to the pump body, submersible pumps eliminate the need for external priming, making them ideal for various scenarios. Recent technological advancements have significantly improved their efficiency, durability, and versatility, solidifying their importance across multiple industries.

As global demand for effective water management solutions increases alongside industrial expansion, the submersible pumps market is experiencing substantial growth. This article explores the current state of the market and the key drivers influencing its development.

Submersible Pumps Market

The global v was valued at $12.7 billion in 2022 and is projected to reach $24.4 billion by 2032, growing at a compound annual growth rate (CAGR) of 6.9% from 2023 to 2032. Key growth drivers include urbanization and industrialization, which boost the demand for efficient water management systems, particularly in wastewater treatment. The water and wastewater segment led the market in 2022, expected to grow at a CAGR of 6.5% during the forecast period.

Submersible pumps are widely used in grit and wastewater sectors, favored for their compact design and lower installation costs. They are essential in sewage treatment, notably grinder pumps that transport solid materials efficiently. Deep-well submersible pumps and vertical turbine pumps are also common in irrigation, showcasing their versatility.

Top Manufacturers in the Market

The submersible pumps market is characterized by a high level of fragmentation, featuring numerous participants such as Franklin Electric Co., Inc., Grundfos Pumps India Private Ltd., KIRLOSKAR BROTHERS LIMITED, KSB Limited, Pentair, Sulzer Ltd, TSURUMI MANUFACTURING CO., LTD, WILO SE, and Xylem.

Grundfos

Grundfos is a leading Danish manufacturer of energy-efficient submersible pumps, specializing in applications for clean water, wastewater treatment, and industrial use. Key benefits of Grundfos submersible pumps include:

• Energy Efficiency:

Utilizing advanced motor technology, these pumps minimize energy consumption while maximizing water flow, leading to lower electricity costs and a more sustainable solution.

• High Durability:

Constructed from corrosion-resistant materials, Grundfos pumps are designed to endure harsh water conditions, ensuring optimal performance over time.

• Compact Design:

Their space-saving design allows for direct placement in water sources like wells or tanks, making them ideal for limited spaces.

• Quiet Operation:

Operating underwater, these pumps generate minimal noise and vibration, suitable for residential and commercial areas where noise reduction is crucial.

• Reliable Water Flow:

Designed for continuous operation, Grundfos pumps provide a steady and consistent water supply, ensuring uninterrupted pressure across various applications.

Top Grundfos Submersible Pumps for Underground Mining

• SP Series:

A vertical multistage pump made from high-grade stainless steel, the SP Series is highly reliable and excels in deep mining applications. It offers high flow rates and energy efficiency, making it ideal for dewatering and slurry transport.

• SQ/SQE Series:

This compact pump features advanced technology, including a variable frequency drive (VFD) for energy efficiency and remote monitoring capabilities. Made from stainless steel, it is

perfect for clean water and small solid slurries in confined mining spaces. This compact pump features advanced technology, including a variable frequency drive (VFD) for energy efficiency and remote monitoring capabilities. Made from stainless steel, it is perfect for clean water and small solid slurries in confined mining spaces.

• SE Series:

A heavy-duty pump designed for demanding conditions, the SE Series handles high-capacity, high-head pumping tasks. Its corrosion- and abrasion-resistant construction ensures durability, making it suitable for large-scale dewatering and challenging materials in mining operations.

Wilo SE

Wilo SE, a German manufacturer, specializes in energy-efficient solutions for buildings, water management, and industrial use. Their submersible pumps, including centrifugal models and aeration systems, are designed to optimize performance while minimizing energy consumption and environmental impact.

Core Products and Services:

• **Submersible Drainage Pumps** are ideal for draining rainwater, flood control, and dewatering fish ponds or basements. They operate within a liquid temperature range of 0–40°C and can be submerged up to 100 ft (30m). Features include dual mechanical seals for enhanced protection and an auto-cut thermal motor protector. An example model, DP 50/11-04-V, has a discharge of 50 mm and a shut-off head of 4 m.

• **Submersible Vortex Pumps** efficiently drain sewage from basements, hotels, and industrial processes. They share similar temperature and depth ratings as drainage pumps, featuring a vortex impeller for effective fluid movement. The model VP 50/10-04-V has a discharge of 50 mm and a solid passage of 35 mm.

• **Submersible Cutter Sewage Pumps** are specifically designed for draining sewage from basements and septic tanks. They feature a cutter impeller with tungsten carbide tips for shredding solids, maintaining a maximum submersion depth of 100 ft (30m). The model CSP 80/20-22-C has a discharge of 80 mm and a rated power of 2.2 kW.

Tsurumi Manufacturing Co., Ltd.

Tsurumi Manufacturing Co., Ltd., located in Japan, specializes in producing heavy-duty submersible pumps designed for construction, mining, and wastewater management. These pumps are engineered to endure harsh environments and effectively handle abrasive and corrosive liquids, making them suitable for challenging applications.

Notable Products:

• Submersible Sewage Pumps:

The NH-series from the “TSURUMI UNIVERSE” brand features durable cast iron construction with discharge bore diameters from 50 to 150 mm and motor outputs from 0.75 to 11 kW. It includes various impeller types—Cutter, Vortex, and Channel. The NHC-series shreds foreign objects with a tungsten carbide cutting edge, while the NHU-series reduces clogging with its semi-vortex design.

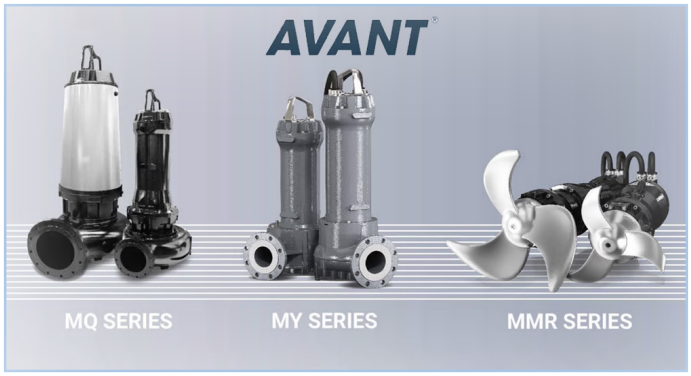
These pumps are ideal for septic tanks, wastewater treatment, and sewage drainage, incorporating advanced technologies for durability and reduced maintenance costs.

• Pumps for Flood Countermeasures:

The KRS-series submersible pumps are designed for construction work, offering a maximum flow rate of 12 m³/min. They can be easily converted into rain drainage pumps without needing new pump stations or drainage equipment, providing practical flood countermeasures. With discharge bore diameters from 80 to 250 mm and motor outputs ranging from 2.2 to 22 kW, users can select the most suitable model for their conditions.

AVANT Series

The AVANT Series eatures high-efficiency, explosion-proof pumps tailored for the wastewater industry. Utilizing IE3 premium efficiency motors, these pumps significantly reduce energy consumption. Constructed from durable stainless steel, they resist corrosive environments and handle solids effectively. The MY and MQ Series offer various impeller types and specifications, including discharge bore diameters from 2 to 16 inches and motor outputs from 4 to 215 hp. The MQ Series also includes a closed-circuit cooling



Sulzer

Sulzer, a Swiss multinational, specializes in high-efficiency submersible pumps for water and wastewater treatment, offering compact and durable solutions suitable for both small- and large-scale water management projects.

Key Products

• Submersible Sewage Pump (ABS XFP):

This model is ideal for wastewater pumping stations, featuring Premium Efficiency IE3 motors and the ContraBlock family of impellers, ensuring efficient and reliable operation.

• Submersible Wastewater Pump (ABS AS):

The AS range includes robust pumps with outputs from 1 to 3 kW, designed for pumping clear water, wastewater, and sewage in both domestic and commercial settings.

• Light Drainage Pump (ABS Robusta):

Models 200 and 300 are plug-in submersible pumps capable of handling wastewater containing solids up to 10 mm.

• Light Drainage Pump (ABS Robusta 200 C):

This model is tailored for internal or external use, particularly for pumping condensate water from heating systems or lightly aggressive water containing solids up to 10 mm.

Pentair

Pentair, a leader in water treatment technologies, offers Hydromatic submersible pumps designed for sewage and grinder applications, ensuring effective wastewater management in both residential and municipal systems.

The Hydromatic SPD50H/100H submersible pumps

The SPD50H features a 1/2 horsepower motor, handling up to 110 gallons per minute (GPM) with a maximum head of 50 feet, while the SPD100H boasts a 1 horsepower motor, managing capacities of up to 140 GPM and heads of 63 feet. Constructed with durable cast iron for the pump volute, motor housing, and seal housing, these pumps ensure longevity. The non-clogging, two-vane cast iron impeller can handle solids up to 3/4 inch in diameter.

Key Features

Dual Mechanical Shaft Seals:

Provides enhanced leak protection.

• Oil-Filled Motors:

Superior cooling.

Permanent lubrication for extended service life.

• Automatic Operation:

Utilizes a diaphragm pressure switch for reliable performance.

Piggyback Plug:

Allows for easy conversion to manual operation.

Safety Features:

Seal failure sensor probe is standard on three-phase units, enhancing operational safety.

Franklin Electric

Franklin Electric, a U.S.-based company, offers a wide range of robust submersible pumps designed for residential, agricultural, commercial, and industrial applications.

Submersible Products

• Motor Types:

Franklin Electric provides motors in sizes of 4”, 6”, 8”, 10”, and 12”, featuring both encapsulated and rewindable options. The encapsulated motors utilize StatorShield™ technology to enhance durability and heat dissipation.

• Performance Features:

Power ratings range from 0.25 kW to 400 kW, with thrust loads varying based on motor specifications. The pumps have protection ratings of IP68, allowing them to operate effectively in challenging environments.

• Applications:

These pumps are suitable for various applications, including water supply, irrigation, wastewater management, and industrial cooling systems. Additionally, high-efficiency systems are available, offering energy savings of up to 21% compared to conventional motors, making them an economical and sustainable choice for users.

Conclusion

Submersible pumps are crucial for efficient water management in residential, agricultural, and industrial sectors. Technological advancements have enhanced their energy efficiency, durability, and versatility, meeting the rising demand for effective water solutions. The market is expected to grow significantly due to urbanization and industrialization. Leading manufacturers like Franklin Electric, Grundfos, and Tsurumi are innovating high-performance products, ensuring reliable operation and sustainability in water management practices across various applications.

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Futureproof Developments Smart Cities in the Middle East

Urbanization continues to grow at a steady rate, with the global population approaching 8 billion. Currently, half of the world's population lives in urban areas, while cities account for 85% of global GDP.

By 2050, the population is expected to reach approximately 9.8 billion, with more than two-thirds of people living in urban environments.

This rapid transformation puts cities at the forefront of addressing climate change and advancing efforts towards a more sustainable future.

However, intensive urbanization brings significant social challenges, such as environmental degradation, socio-economic gaps, energy insecurity, and increased natural and man-made disasters that exacerbate climate change.

The idea of smart cities offers a promising solution to these pressing issues by making urban centers more sustainable, resilient, environmentally conscious, and livable.

By integrating advanced digital technologies such as the Internet of Things (IoT), artificial intelligence, 5G networks, cloud computing, and big data, smart cities aim to enhance well-being, competitiveness, transparency, and sustainability.

Smart Cities in the Middle East

The Middle East is characterized by a blend of historical heritage and rapid urbanization, with projections indicating that by 2030, 60% of the population will live in urban areas. This shift has led to significant investments in smart city initiatives aimed at enhancing quality of life and sustainable development.

The UAE is at the forefront of this transition, focusing on knowledge-based economies and smart city advancements. Recent rankings show:

- Riyadh: 25th globally
- Makkah: 52nd
- Jeddah: 55th
- Doha: 59th (up 11 spots)
- Muscat: 88th

Cities like Abu Dhabi, Zurich, Oslo, Singapore, Beijing, and Seoul consistently rank in the top 20 due to their economic innovation, technological progress, quality of life, environmental sustainability, and social inclusivity.

King Abdullah Economic City (KAEC)

KAEC is a groundbreaking smart city project situated along Saudi Arabia's Red Sea coast.
Positioned strategically between Jeddah and Rabigh, the development plays a key role in the Kingdom's vision for economic diversification and long-term growth.
Spanning an area of 185 square kilometers, KAEC features the King Abdullah Port, recognized as the world's most efficient port by the World Bank, and the KAEC Industrial Valley, a hub designed to strengthen Saudi Arabia's logistics and light manufacturing sectors.
Already, over 100 multinational and local companies have established their presence within the city. In terms of logistics, KAEC boasts the state-of-the-art King Abdullah Port, designed to streamline cargo management and promote global trade.

The city's planning emphasizes sustainability, incorporating eco-friendly technologies such as renewable energy solutions and water conservation initiatives.

King Salman Energy Park (SPARK)

King Salman Energy Park is an industrial city developed by Saudi Aramco near Buqayq, spanning 50 square kilometers and expected to be completed by 2035. It supports activities related to oil exploration, production, refining, petrochemicals, energy services, and water treatment, with a focus on innovation and growth.
The city is divided into five zones:

- Industrial Zone: Contains five specialized complexes for sectors like manufacturing, machinery, chemicals, and metal processing.
- Logistics Zone: Features a dry port, customs facilities, and a logistics hub, with a capacity to handle 8 million metric tons of goods annually.
- Business Zone: Hosts SPARK's administrative center and Saudi Aramco's headquarters for drilling and maintenance operations.
- Commercial Real Estate Zone: Includes office spaces, restaurants, and retail outlets for business activities.
- Training Zone: Home to ten specialized centers for training energy sector professionals.

By 2035, SPARK is expected to generate over 100,000 jobs and contribute SAR 22.5 billion
nually to Saudi Arabia's GDP.

Masdar City as "greenprint" for smart cities

Abu Dhabi, the capital of the UAE, has confirmed its position as the smartest city in the Middle East and North Africa region, achieving a distinguished global ranking of 13th in the Smart Cities Index 2023, published by the International Institute for Development Management.

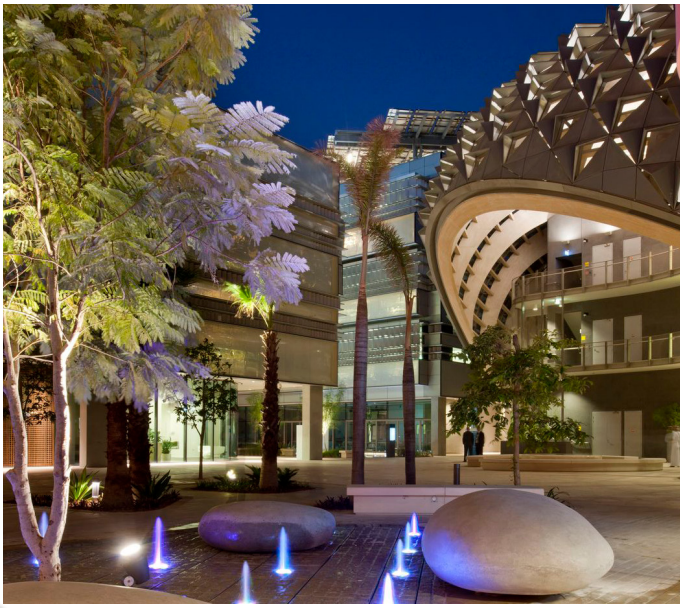
This recognition is in line with Abu Dhabi's role as the headquarters of the Masdar City initiative, which has been a leading center for clean technology and sustainable city design for more than 15 years.

> "Dr. Sultan Ahmed Al Jaber, Minister of Industry and Advanced Technology, Masdar City seeks to reduce consumption, promote innovation and research, and improve quality of life."

According to Sustainability revolves around several pioneering initiatives:

- **Energy Efficiency**: Using solar energy through photovoltaic panels and smart energy management.
- **Sustainable Transport**: Automated Rapid Transit System supported by electric vehicles.
- **Recycling and Resource Management**: Advanced waste management and water conservation systems.
- **Research and Innovation**: The Masdar Institute, established in collaboration with MIT, promotes sustainable research.

Masdar City is a global benchmark for smart urban planning and sustainable living, reinforcing Abu Dhabi's leadership in smart city development in the region.



Sultan Haitham City, Oman

Sultan Haitham City in Oman embodies the principles of Oman Vision 2040 by focusing on sustainability, innovation and advanced urban living. The city relies on solar energy and waste-to-energy facilities, and is designed to accommodate 100,000 residents. Located in Muscat, it aims to become a modern and sustainable urban hub that supports the country's population growth and economic ambitions. The city spans 14.8 square kilometres, and promises a dynamic, data-driven environment that enhances quality of life and supports entrepreneurship and technological advancement.

- **Transportation**

The city will feature advanced traffic management systems and an integrated public transport network aimed at reducing congestion and improving mobility.

- **Sustainability**

The initiative focuses on environmentally friendly practices including adopting renewable energy sources, reducing waste and creating large green spaces to enhance environmental health.

- **Digital Governance**

A unified digital platform will provide easy access to government services, with efforts to bridge the digital divide to ensure equitable access to technologies.

- **Social Safety**

Residents will benefit from smart healthcare systems that provide high-quality medical services. Safety measures and emergency response systems will enhance community safety, with digital tools and feedback channels encouraging citizens to participate in the city's development.

- **Cybersecurity Risks:**

The increasing reliance on in terconnected digital systems introduces heightened cybersecurity concerns. Safeguarding critical infrastructure and protecting sensitive citizen data from potential cyber threats is an ever-present and urgent priority.

The challenges faced by smart cities can be outlined as follows:

• Infrastructure Development: Establishing the infrastructure needed to support smart technologies poses significant challenges. Upgrading existing systems and introducing new frameworks demand substantial investments and meticulous planning.

• Regulatory Hurdles: Adjusting regulations to facilitate emerging technologies and data management is often a multifaceted process. Addressing privacy concerns, ensuring robust data security, and streamlining regulatory policies are key to
enabling seamless adoption of smart solutions.

• Sustainability and Energy Management: Many Middle Eastern cities face challenges related to high energy consumption and sustainability.
Integrating smart technologies while prioritizing energy efficiency, sustainable practices, and effective waste management is vital for long-term success.

• Citizen Engagement: Driving active public participation and fostering inclusivity in smart city projects remains an ongoing challenge. Efforts are needed to bridge the digital divide and ensure equitable access to the benefits of these advanced technologies for all citizens.

• Cybersecurity Risks: The increasing reliance on interconnected digital systems introduces heightened cybersecurity concerns. Safeguarding critical infrastructure and protecting sensitive citizen data from potential cyber threats is an ever-present and urgent priority.

Future Trends and Opportunities in Middle Eastern Cities

Urban development has seen significant progress over the past decade thanks to the use of Artificial Intelligence (AI) and the Internet of Things (IoT), transforming cities into more accessible and attractive places.
These technologies contribute to enhancing comfort, safety, and efficiency, as evidenced by the use of facial recognition systems.
However, these innovations face challenges related to risks and uncertainties, which calls for strengthening smart systems against threats.
The increasing integration of these technologies offers great opportunities for planners and residents, and this progress is based on the analysis of big data, indicating a new era that redefines the interaction between communities and their environments.

Conclusion

The concept of smart cities is rapidly gaining traction across the Middle East, with the potential to transform how people live, work, and engage with their surroundings. The adoption of smart city technologies holds the promise of enhancing citizens' quality of life by improving public services, expanding access to information, and fostering a more sustainable urban environment.
Furthermore, smart cities can attract investments, generate employment opportunities, and drive economic growth throughout the region.
Despite these promising benefits, several challenges must be addressed to ensure the successful realization of smart city initiatives. By addressing these challenges, smart cities can become a transformative reality in the Middle East, elevating living standards and driving regional development.

AquaEnergy Expo

Magazine

Blue | Green | Sustainable | Smart

WATER NEWS BRIEF

May | 2025

www.aquaenergyexpo.com

NWC launches $533 million water and sanitation initiative in Riyadh covering 30 new projects

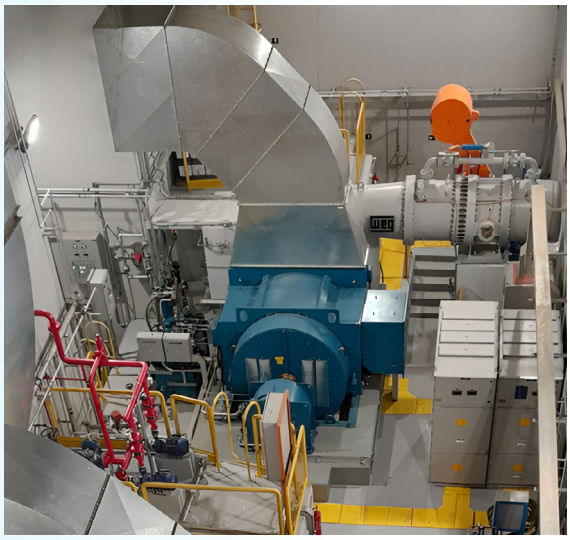
The National Water Company (NWC) has launched 30 new water and sanitary drainage projects in the Riyadh region, covering 1,955 kilometers at a cost of nearly 2 billion Saudi Riyals ($533 million). This initiative aims to enhance infrastructure in water and environmental services and improve service coverage for customers. The projects include 16 water initiatives and 14 sewerage projects across various districts in Riyadh and surrounding governorates, with a total length of 1,955 kilometers and 763 kilometers, respectively. Additionally, NWC plans to construct 18 water reservoirs with a capacity of 85,000 cubic meters and pumping stations with a daily volume of over 247,000 cubic meters. This effort supports the Kingdom's Vision 2030 goals for water security and environmental sustainability.

Egypt secures €262 million from France, EU for water and energy infrastructure projects

Egypt, France, and the European Union (EU) have signed nine agreements totaling €262.3 million to support various initiatives in Egypt, including water treatment, sanitation, renewable energy, and railway projects. These agreements were finalized during French President Emmanuel Macron's state visit, marking a new strategic partnership between Egypt and France. Rania Al-Mashat, Egypt's Minister of Planning, described the agreements as a significant advancement in Egyptian-French relations, enhancing the Egyptian-European partnership. Key projects include a €50 million energy project to modernize Alexandria's electricity grid, a €68 million wastewater treatment plant serving 1.5 million people, a €70 million railway project to improve transport efficiency, and a €50 million expansion of the Al-Gabal Al-Asfar wastewater treatment facility to boost capacity and sustainable water management.

WEG supplies complete equipment for Paredinha Hydropower Plant

Small Hydroelectric Plants are crucial for renewable energy, utilizing river hydraulics to generate sustainable electricity. To ensure their reliable operation, high-tech and durable equipment is vital. Ibemapar chose WEG for their expertise in hydropower, which offers complete solutions combining advanced engineering and manufacturing of electrical and mechanical equipment. For the Paredinha Hydropower Plant, WEG supplied three hydraulic turbines (7,292 kW), three generators (7,788 kVA), electrical panels, ten transformers (approximately 50,000 kVA), and a substation. This project follows a successful collaboration on the Boa Vista II Hydropower Plant, where WEG provided similar high-performance equipment. The reliability of WEG's solutions ensures operational stability and a secure return on investment, reinforcing their commitment to the hydropower sector.



Veolia and Tampa Bay Water finalize $181 million agreement for expansion of regional water supply

Veolia North America has secured a contract with Tampa Bay Water (TBW) to lead the design, construction, and operation of a $181 million expansion aimed at enhancing drinking water capacity for over 2.5 million customers along Florida's Gulf Coast. This project, part of a nearly 30-year partnership, will increase daily production by up to 12.5 million gallons at TBW's Regional Surface Water Treatment Plant. The upgrades include adding a fifth ACTIFLO and ozone treatment system, improved filtration, and enhanced water disinfection and storage. Once completed, the system will sustainably provide up to 110 million gallons per day, supporting regional growth and aligning with Veolia's GreenUp strategy for ecological transformation.

Aqua Pennsylvania's high-tech robot adds efficiency and accuracy to PFAS testing in drinking water

Aqua Pennsylvania is at the forefront of testing drinking water for PFAS, or "forever chemicals," utilizing a lab robot to enhance efficiency and accuracy in testing. According to Alicia Beauchamp, Aqua's Lab Water Quality Director, the robot plays a crucial role by measuring and transferring microliter volumes of water samples, reducing testing time from 3-4 days to just 24 hours. In 2024, Aqua tested 4,000 water samples for PFAS, doubling the previous year's figures. The lab is certified for PFAS testing in Pennsylvania, quantifying compounds in the part per trillion range. Aqua is committed to treating PFAS in drinking water, complying with Pennsylvania's maximum contaminant level (MCL) and preparing for the U.S. EPA's MCL regulations set to take effect in 2029.

Sulzer and Manweir sign 10-year strategic service partnership in Qatar

Sulzer has partnered with Manweir WLL, a prominent engineering services provider in Qatar, to enhance rotating equipment repair and service quality. Sulzer's teams will operate from Manweir's Ras Laffan facility, allowing for faster service delivery to oil and gas, power generation, water desalination, and industrial clients without needing to send equipment abroad. This partnership aims to strengthen Qatar's industrial supply chain and align with the country's In-Country Value (ICV) vision, supporting sustainability goals outlined in Qatar National Vision 2030. Both companies plan to leverage local expertise and global best practices to improve service standards, drive innovation, and foster sustainable growth in Qatar's industrial sector.

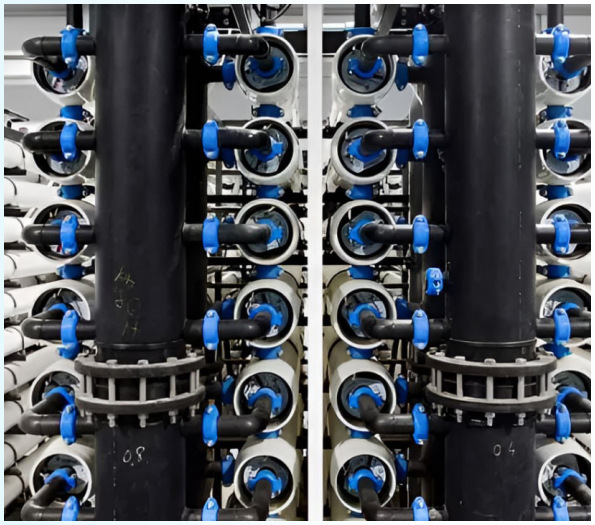
DuPont Water Solutions Launches WAVE PRO for Ultrafiltration Modeling

DuPont Water Solutions has introduced WAVE PRO, an advanced online modeling tool for ultrafiltration (UF) water treatment applications, including drinking water, industrial utility water, wastewater, and seawater desalination. This next-generation tool enhances the Water Application Value Engine (WAVE) by guiding water professionals through the design process with high accuracy. Users can simulate specific conditions and evaluate scenarios to optimize configurations while considering project-specific economics. WAVE PRO is web-based, allowing secure access from any device and enabling collaboration among teams. The tool supports sustainability goals by minimizing chemical usage and costs associated with sludge disposal. Available for free on the WaterApp, WAVE PRO contributes to DuPont's mission of addressing global water challenges across various sectors.

Global Omnium, Telefónica Tech, and Google Cloud transform water sector with AI

Global Omnium and Telefónica Tech have partnered with Google Cloud to enhance the water sector using AI and data analytics. This collaboration aims to improve operational efficiency, ensure process traceability, and provide better customer service. Global Omnium, which has undergone significant digital transformation, will leverage Google Cloud's public cloud solutions for scalability and flexibility. A notable outcome of this partnership is an innovative project that uses AI to monitor Posidonia meadows, aiding conservation efforts in the Mediterranean. This agreement builds on their previous collaboration, reinforcing their commitment to sustainable practices and advancing technology in water management, ultimately enhancing competitiveness and environmental protection.

ACCIONA unveils innovative turbidity prediction system for desalination plants



ACCIONA has introduced an advanced turbidity prediction system for its desalination plants, utilizing two innovative models developed by its Infrastructure division. This system, currently operational at the Ras Abu Fontas 3 (RAF 3) reverse osmosis plant in Qatar, predicts water quality changes both in the short term (hours) and long term (days). By providing real-time turbidity forecasts, the system enables operators to proactively manage water quality, preventing potential disruptions and optimizing plant availability. The technology enhances the efficiency of water distribution networks and boosts resilience against climatic variations. With successful implementation at RAF 3, ACCIONA plans to refine the model for broader application, reinforcing its leadership in sustainable desalination technology and improving the longevity and efficiency of water resources.

AECOM strengthens U.K. & Ireland Water and Energy platform with acquisition of Scotland-based Allen Gordon LLP

AECOM has acquired Scotland-based Allen Gordon LLP to enhance its Water and Energy platform in the U.K. and Ireland, coinciding with over £250 billion in expected infrastructure investment over the next decade. Established in 1971, Allen Gordon is known for its technical design and advisory services in the water utilities and renewable energy sectors. AECOM's CEO for Europe and India, Richard Whitehead, emphasized the importance of this acquisition at a time of increasing market spending. The integration will strengthen AECOM's position in the growing water and energy sectors, with plans to double its water business globally in five years. Financial details of the acquisition remain undisclosed.

Aganova joins forces with Microsoft, Uisce Éireann, and SUEZ to reduce water loss in Dublin

Aganova has partnered with Uisce Éireann, SUEZ, and Microsoft to launch a water conservation initiative in Dublin, aimed at reducing water network losses. This project, part of Microsoft's Replenishment Program, addresses the city's significant water scarcity, where 33% of water is lost before reaching consumers. Aganova will implement its Nautilus System, an acoustic technology that detects leaks in large-diameter pipelines without disrupting service, covering 40 km of Dublin's water transport system. Once leaks are identified, Uisce Éireann will manage repairs to ensure sustainable water supply. This collaboration not only enhances water efficiency but also supports climate mitigation by reducing energy consumption in water treatment. The initiative embodies a commitment to innovation and sustainability.

World Bank Group approves $200 million credit to increase access to water and sanitation in Guinea

The World Bank Group has approved a $200 million credit for the Guinea Water and Sanitation Project (PEAG), set to run from 2025 to 2031. This initiative aims to enhance access to drinking water in Conakry, improve the performance of water and sanitation institutions, and construct necessary infrastructure. The project includes a recovery plan for the Guinea Water Company and support for sanitation governance and WASH facilities in schools. Total financing amounts to €246 million ($274 million), with contributions from the Guinean government, the European Investment Bank, and the European Union. Expected beneficiaries include over 2.6 million people, with 572,200 gaining access to drinking water for the first time. The project emphasizes integrated water resource management and governance improvements.

Global Water Events

Pump Industry Awards 2025

Date: 13 March 2025
Location: The Hilton at St. George's Park, Burton upon Trent, UK

The Pump Industry Awards is now recognised as one of the leading award ceremonies within the industrial arena. Founded by the BPMA in 2000, the awards programme celebrates the achievements of pump companies and individuals who strive to go the extra mile.

Website: **www.pumpindustryawards.com**

WateReuse 2025 Symposium

Date: From 16 to 19 March 2025
Location: Tampa, FL, United States

The Annual WateReuse Symposium offers the most extensive learning opportunities in water recycling, addressing topics such as policy, technology, operations, and communications for various applications, including irrigation, potable reuse, onsite systems, and industrial processes. In 2025, we celebrate the 40th anniversary of the WateReuse Symposium, with this year's theme being Turning the Tide Toward Reuse.

Website: watereuse.org

7th International Conference and Exhibition Desalination Latin America

Date: From 19 to 20 March 2025
Location: Santiago, Chile

2 days congress, International investment conference and exhibition is the only business platform to develop effective strategies, share experience, present new investment projects and innovations, consolidate the efforts of governments and businesses to implement desalination projects and increase water reserves throughout Latin America.

Website: desalinationlatinamerica.com

Smart Water Systems Conference

Date: From 15 to 16 April 2025
Location: Hilton London Kensington, London

Smart Water Systems is a two-day conference which aims to assist water utility companies, solution/service providers, government officials and finance/investment companies to collaborate, network and examine new technologies and latest developments to ensure more efficient leakage detection and management.

Website: www.smgconferences.com

FiltXPO 2025

Date: From 29 to 1 May 2025
Location: Tampa, FL, United States

FiltXPO™ 2025 at the Miami Beach Convention Center in Miami Beach, Florida, invites you to explore the future of filtration technologies and innovations. Discover the latest advancements from top-tier exhibitors and gain insights into the factors shaping the filtration market. Stay ahead of the competition by learning from industry leaders and positioning yourself as a key player in the field.

Website: www.filtxpo.com

Global Water Summit

Date: From 4 to 7 March, 2025
Location: West Palm BEeach, Florida

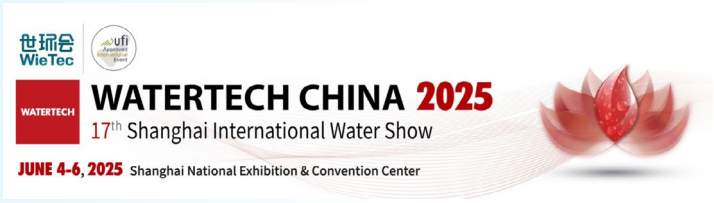
In a world that has crossed the 1.5°C threshold, water security faces unprecedented pressure. The challenge requires an immediate and sharp increase in capital deployment into our sector. At GWS 2025, we're bringing together the leaders who can make this happen.

Website: www.watermeetsmoney.com

Watertech China

Date: From 3 to 5 June 2025
Location: National Exhibition & Conference Center, Shanghai, China

WATERTECH CHINA, a global exhibition platform for water treatment, environmental protection, and energy-saving solutions, returns to the National Exhibition & Convention Center (NECC) in Shanghai, China, from June 3 to 5, 2025.



Website: www.watertechsh.com

IFAT Africa

Date: From 8 to 10 July 2025
Location: Gallagher Convention Centre, Johannesburg, South Africa

IFAT Africa is a three-day trade fair dedicated to presenting cutting-edge technologies and solutions for water, sewage, waste, and recycling tailored to the sub-Saharan African market. Serving as a vital gateway, it connects international companies with the African market and enables African enterprises to access global opportunities. The event brings together key industry players, senior buyers, and decision-makers, fostering collaboration and innovation across the region.

Website: ifat-africa.com

Indo Water Expo & Forum 2025

Date: From 13 to 15 August, 2025
Location: Jakarta International Expo, Kemayoran , Indonesia

Indonesia's water, wastewater and recycling technology event returns with international pavilions, technical product presentations and B2B business matchmaking.

Website: indowater.com

World Water Week

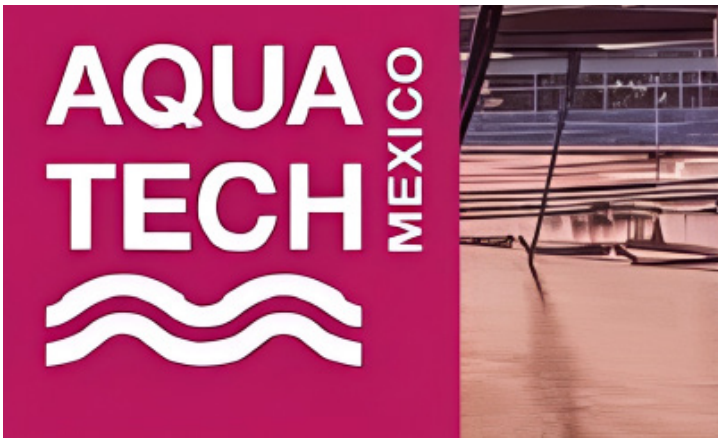
Date: From 24 to 28 August 2025
Location: Stockholm, Sweden

World Water Week is a five-day event on global water issues, organized by Stockholm International Water Institute since 1991. World Water Week is a non-profit event, co-created together with leading organizations. It offers an unusual mix of participants and perspectives, with sessions on a broad array of water-related topics, ranging from food security and health, to agriculture, technology, biodiversity, and the climate crisis.

Website: www.worldwaterweek.org

Aquatech Mexico 2025

Date: From 2 to 4 September 2025
Location: Mexico City, Mexico

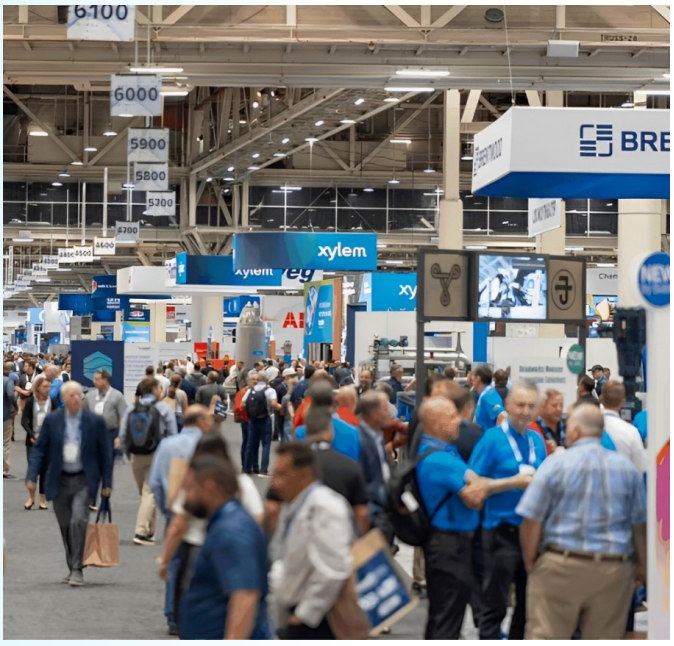


Discover water innovation at Aquatech Mexico 2025, a premier event connecting professionals, experts, and investors across the Americas. Over three intensive days, September 2-4, participants engage in business networking, knowledge exchange, and exploration of regional water technology opportunities. This dynamic platform facilitates valuable partnerships and insights into the Americas' water technology market.

Website: www.aquatechtrade.com

WEFTEC 2025

Date: From 27 September to 1 October, 2025
Location: McCormick Place, Chicago, Illinois, USA



WEFTEC 2025 is the premier water industry event in North America. Connect with over 20,000 water professionals from 100+ countries and 50+ industries, driving solutions and innovations for a sustainable water future.

Website: www.weftec.org

London Climate Technology Show

Date: From 1 to 2 October 2025
Location: ExCeL London, London, UK

The London Climate Technology Show is a two-day event focussing on the climate technology sector. Building on the achievements of previous editions, the event will provide a platform for showcasing disruptive solutions and fostering discussions on effective decarbonisation strategies. The London Climate Technology Show aims to be the largest climate technology exhibition and conference in the world for advancing the global net zero economy transition and shaping a sustainable future with ground breaking and collaborative technologies.

Website: climatetechshow.com

AQUATECH China

Date: From 5 to 7 November 2025
Location: Shanghai New International Exhibition Center (SNIEC), Shanghai, China

Aquatech China is a three-day event that brings together the worlds of water technology and water management, aiming to present integrated solutions and holistic approaches to water challenges that Asia is facing. Aquatech China is the leading water technology trade show in China, covering all aspects of water: drinking water, industrial water, waste water treatment, sludge treatment, smart water solutions and water management.

Website: www.aquatechtrade.com

All Ireland Water & Wastewater Expo

Date: 4 December, 2025
Location: Leopardstown Pavilion, Leopardstown Racecourse, Foxrock, Dublin 18, D18 C9V6, Ireland

The All-Ireland Water & Wastewater Expo is a one-day conference uniting stakeholders to discuss key issues in the water sector. With €6 billion allocated through 2026, investments will enhance infrastructure and treatment facilities. Industries face rising demands for high-quality water, driving investments in efficiency and sustainability initiatives.

Website: www.waterengineering.ie

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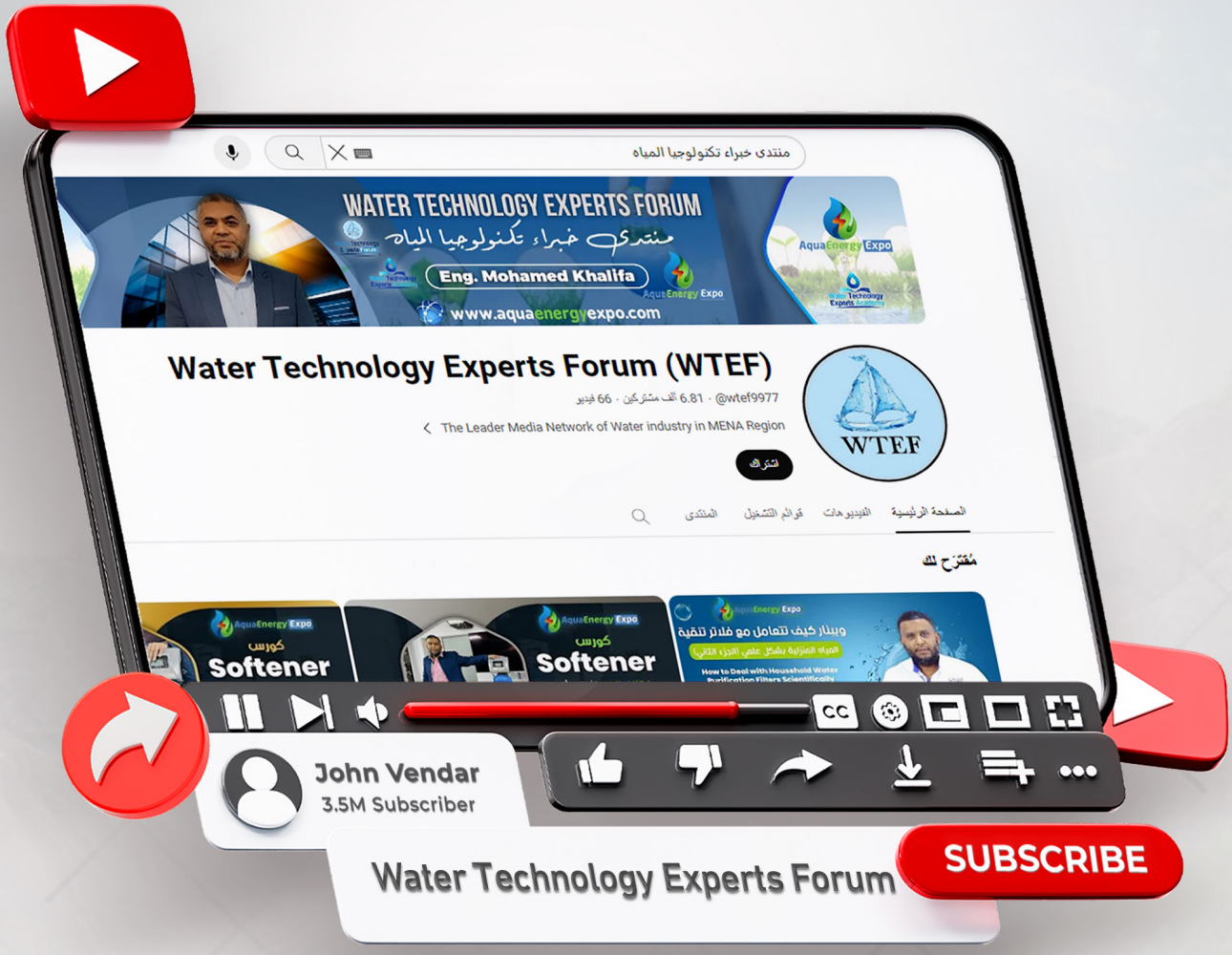

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WEBINARS

AquaEnergy Expo Magazine

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Weekly Webinars

Join us on Telegram Group for online Webinars

Bahr El-Baqar Wastewater Treatment Plant Technologies (5.6 Million m3/day)

Date: Saturday, May 24th **Time:** From 09:00 to 11:00 PM

Dr. Mohamed Haikal **Eng. Mohamed Khalifa**

Carbon Footprint and Greenhouse Gas (GHG) Accounting

Date: Friday, May 9th

Time: from 05:00 to 07:00 PM

Dr. Hany Nabil Ibrahim

Green Cement Production from Seawater

Date: Tuesday, May 13th

Time: from 09:00 to 11:00 PM

Dr. Omar Daoud

Multistage High-Pressure Pumps in RO

Date: Friday, May 16th

Time: From 08:00 to 10:00 PM

Eng. Abdel-Fattah Abbas

Rotating Equipment Maintenance Engineer

Date: Saturday, May 17th

Time: From 08:00 to 10:00 PM

Eng. Mohamed Zidan

Solar Energy and Nanotechnology in Sustainable Water Management

Date: Friday, May 23th

Time: From 07:00 to 09:00 PM

Dr. Eman Mostafa

Control Systems

Date: Friday, May 30th

Time: From 08:00 to 10:00 PM

Eng. Karim Abo Salem

Localization of Desalination Equipment Manufacturing in Egypt and its Impact on the Egyptian Economy in Partnership with the Public and Private Sectors.

Date: Saturday, May 31th

Time: From 08:00 to 10:00 PM

Dr. Talaat Aboul Fotouh

(Saudi Arabia Time)

Innovating the Deep: How Underwater Turbines are Shaping France's Energy Future

Wind turbines have become a familiar sight in the modern renewable energy landscape. Now, a lesser-known but equally promising technology is making waves—underwater turbines. Also known as tidal or marine current turbines, these devices harness the predictable power of ocean currents and tidal flows to generate continuous electricity, offering a reliable alternative to wind and solar power. France is set to embark on one of its first commercial-scale tidal energy pilot projects, the NH1, which promises to supply thousands of locals with clean electricity. This ambitious initiative features the world's most powerful underwater turbines and is being developed off the coast of Normandy, having secured funding from the European Union.

The Rise of Underwater Turbines: Tapping into Tidal Energy

Underwater turbines, also known as tidal or marine current turbines, represent an innovative approach to harnessing renewable energy by converting the kinetic energy produced by currents and tidal flows into electricity. These turbines operate similarly to wind turbines, with blades that rotate as water flows past them, driving a generator to produce a continuous electrical output, day and night.

• Technical Aspects of Underwater Turbines

The technical design of underwater turbines includes a rotor shaft connected to a generator via a flexible coupling and gearbox, all housed in a nacelle. Various configurations exist, with the most common being horizontal axis turbines, although vertical axis designs are also available. Additional variants include ducted or open rotors, and concentrators, which are shrouds that direct water flow toward the blades to enhance efficiency.

There are two principal categories for tidal power: tidal stream systems that rely on the fast flow of water through turbines and tidal range systems, which capture the potential energy difference between high and low tides. Unlike wind and solar, tidal energy is not affected by prevailing weather conditions. Instead, tidal flow is caused by gravitational interactions, which are predictable and infinite, making tidal power a reliable energy-generating solution.

• Advantages of Tidal Energy

The relatively high density of fast underwater currents compared to wind, often magnified by sub-surface topological features such as headlands, inlets, and straits, means their blades can be more compact and turn more slowly while still generating a high energy output. However, as with many renewable projects, there is always a cost associated with what seems like a benign form of energy generation. In the case of underwater turbines, extremely high installation and maintenance costs are often cited as major issues, along with regulatory hurdles for securing permits. Of greater concern is the potential impact of their invasive construction on marine ecosystems, something that is not yet fully understood.

For now, the principal value of this kind of energy generation will center on its ability to support broader ambitions of increasing the overall percentage of renewables that contribute to our energy mix.

current data suggests that hydroelectric power contributes only 0.4% (0.13 GW) to total generation, indicating that there is still a long way to go.

Renewables Go Deep

Climate change is the most significant global challenge of this generation. To address it, Europe and France have established ambitious 2030 targets aimed at accelerating the ecological and energy transition while drastically reducing carbon emissions. In this transformation, renewable energy plays a vital role. While solar and wind energy have decreased reliance on fossil fuels, their unpredictable nature highlights the necessity for more reliable renewable energy sources. Tidal energy, utilizing the Moon's gravitational pull to create consistent ocean currents, offers a stable source of electricity.

With an estimated potential of up to 5 GW, tidal power is a key element of France's renewable energy transition, as noted by Ocean Energy Europe

By 2030, its production costs are projected to be on par with those of floating wind energy, positioning it competitively within the future energy mix. Tidal turbines are environmentally friendly, minimally impacting marine ecosystems, and are easy to recycle at the end of their lifespan. Tidal farms are entirely submerged, eliminating any visual, acoustic, or marine disruptions, unlike other renewable energy sources. Additionally, the industry supports local economies, particularly benefiting SMEs and mid-sized businesses. By 2030, France's tidal energy sector is expected to generate 6,000 new jobs, strengthening the local economy and enhancing the nation's energy independence.

Tidal Power Boost

The EU has selected the NH1 tidal energy pilot farm for funding under the "Innovation Fund," a program supporting low-carbon technologies. NH1 is among 85 "Zero-Net" projects awarded a share of €4.8 billion, chosen based on greenhouse gas reduction potential, innovation, maturity, scalability, and economic viability.

• Funding and Economic Viability

"The grants range from €1.4 million to €262 million for projects with the potential to reduce emissions by some 397.6 million tonnes of CO2 equivalent over their first ten years of operation," stated the European Climate, Infrastructure and Environment Executive Agency.

Located in the Alderney Race, NH1 will feature four 3 MW AR3000 turbines, generating 33.9 GWh annually—enough to power 15,000 homes. The project, set to begin operations in late 2027, highlights tidal energy as a reliable and competitive renewable source. According to Normandie Hydroliennes, with Alderney Race offering up to 5 GW of tidal potential, NH1 represents a key step in France's clean energy transition.

- **Cooling Water**

> "Being selected by the Innovation Fund is a major recognition of our work and the impact that our technological system, the innovative Proteus AR3000 horizontal axis turbine, can have on decarbonisation and the energy mix," says Katia Gautier, director of Normandie Hydroliennes (NH).

Developed by Proteus Marine Renewables, the AR3000 turbines are the world's most powerful tidal units and are cost-competitive in electricity generation. Normandie Hydroliennes claims that with it being manufactured in France and assembled at Efinor workshops in Cherbourg, the project emphasizes local expertise, with 80% of its value sourced from French suppliers. The NH1 development is expected to create approximately 400 direct and indirect jobs.

How Much Energy Can the Normandy Tidal Farm Generate?

The Raz Blanchard Channel sea current is recognized as one of the strongest in the world, according to NH. With a potential development capacity of approximately 5 to 6 gigawatts (GW), it could generate 15 to 18 terawatt hours (TWh) of electricity, enough to power 8 million people.

Currently being constructed in the port town of Cherbourg, the underwater turbines will feature a rotor diameter of 24 meters and a capacity of 3 megawatts (MW) each. This initial group of four turbines will produce 34 GWh of energy annually, sufficient to meet the demands of 15,000 local residents. There are additional advantages for the local community. Eighty percent of the project's construction value will be generated in France, where NH commits to creating around 400 direct and indirect jobs.

The remainder will be sourced from Europe to ensure energy sovereignty. Gautier mentions that the €31.3 million grant will allow the company to take "decisive steps" toward realizing the project.

> "We are eager to collaborate with our partners to ensure the NH1 tidal turbine pilot farm is successful, serving as a reference project and contributing to a more sustainable energy future," she adds.

Future initiatives will deploy up to 85 turbines each year, as noted by the Innovation Fund, significantly increasing job creation to enhance France's blue economy.

How will the tidal turbines affect the marine environment?

Installed at a depth of at least 38 meters, NH emphasizes that its pilot farm will not pose any risks to navigation or maritime safety and will operate with consideration for marine life. Field studies indicate a resurgence of fish and marine megafauna at existing project sites. For instance, the MeyGen project off Scotland's coast suggests that turbine foundations and connection cables can serve as "settlement spaces" for various species. Other research indicates that the sound pressure levels produced by tidal turbines are significantly lower than the disturbance thresholds for marine megafauna. The project is anticipated to reduce greenhouse gas emissions by 57,878 tonnes of CO_2 equivalent. The project is expected to save 57,878 tonnes of CO_2 equivalent in greenhouse gas emissions. In total, 85 clean tech projects in 18 countries secured funding from the Innovation Fund last October, in sectors ranging from energy storage to net-zero transport and buildings.

AquaEnergy Expo

Enertopia Corporation

Enertopia's Innovative Solar Moisture System: A Breakthrough in Solar-Powered Desalination

Water scarcity is an escalating challenge, especially for industries and agriculture, which are the largest consumers of this vital resource. Inefficient usage and waste worsen the situation, making the adoption of sustainable solutions essential. While reasonable pricing structures exist, industrial and agricultural enterprises still face environmental constraints, brackish water issues, and a need for decentralized solutions. Traditionally reliant on municipal water supplies, these sectors are now building their own treatment and desalination plants to secure water. Outsourcing water management allows them to focus on core operations while ensuring a reliable supply.

Innovation is crucial in addressing water consumption challenges. Companies like Enertopia are at the forefront, integrating advanced technologies to enhance efficiency, reduce waste, and improve sustainability. Their innovations include cutting-edge desalination technologies, revolutionizing how industries and farms secure water resources. Recently, Enertopia achieved a significant milestone by obtaining a patent from the United States Patent and Trademark Office (USPTO) for a system that combines water production with photovoltaic panels. This advancement underscores the company's commitment to leveraging green technologies to enhance shareholder value while addressing global water scarcity issues.

The role of desalination in water security

The issue of water scarcity continues to be a significant global concern, particularly in arid areas where desalination plants are essential for fulfilling freshwater demands. In Abu Dhabi, UAE, approximately 42% of the region's potable water is sourced from desalination. However, the widespread implementation of these facilities is hindered by considerable financial and logistical challenges.

Moreover, the construction of such large-scale projects often takes years or even decades, rendering them impractical for regions experiencing urgent water shortages.

Consequently, many governments and communities find it challenging to finance and implement desalination technologies, leaving numerous individuals without dependable access to clean water. Enertopia's innovative water-harvesting system presents a promising alternative, offering a more affordable and sustainable solution to tackle these pressing issues.

Building desalination plants is a costly venture, with construction expenses ranging from $1,000 to $2,500 per cubic meter per day (m^3/d) of water production capacity, necessitating substantial upfront investments. In addition to these initial costs, operational expenses are significant, varying between $0.50 and $2.50 per m^3/d for larger plants. The energy requirements further complicate the situation; a facility producing 100 million imperial gallons per day (MIGD) requires about 1,510 MW of power—equivalent to the output of two large nuclear power plants.

Enertopia: A Leader in Green Technology

Enertopia positions itself uniquely in the competitive landscape. Unlike conventional mining companies that solely focus on resource extraction, Enertopia incorporates advanced green technologies to address energy inefficiencies and environmental challenges. Its focus on lithium, a key ingredient in batteries and renewable energy storage, enables it to serve a growing market driven by the expansion of electric vehicles and renewable energy projects.

Furthermore, the company's suite of patented technologies provides a competitive edge, as it offers proven solutions to energy losses in solar systems and effective methods of moisture capture for water production. These innovations not only improve the operational efficiency of energy systems but also enhance the overall sustainability of solar investments. This integrated approach distinguishes Enertopia from other resource companies, making it an intriguing case study for those interested in the convergence of traditional mining and modern green technology solutions.

A New Era in Sustainable Water Solutions

Enertopia Corporation (OTCQB: ENRT) has received a U.S. patent (12231085) for its revolutionary water-producing system, the ENERTOPIA RAINMAKER.

This cutting-edge technology captures atmospheric moisture using photovoltaic (PV) panels, generating between 2.45 and over 4 gallons of water per hour for each 80" x 40" panel under optimal conditions.

The ENERTOPIA RAINMAKER presents a practical and cost-efficient alternative to traditional desalination plants, which are often expensive to construct and maintain, offering a scalable and sustainable solution for water-scarce regions worldwide. With millions of people affected by global freshwater shortages, the need for decentralized and renewable water production methods has become increasingly crucial. Enertopia's technology utilizes natural atmospheric moisture and solar energy, making it an appealing option for off-grid communities, remote areas, and regions with limited access to clean water.

Enertopia's Innovative and Cost-Effective Water Solution

By combining water harvesting with solar power generation, the ENERTOPIA RAINMAKER enhances the return on investment for solar projects by producing both electricity and water. This system is particularly advantageous in regions where seasonal monsoons or coastal humidity create high moisture levels in the air, making it an effective and practical solution for freshwater generation.

During the day, the photovoltaic (PV) panels generate electricity while absorbing heat. As temperatures drop at night, the system promotes condensation, capturing moisture on a specially designed surface. This passive process significantly lowers the energy requirements typically associated with water extraction. Additionally, the system can operate independently of traditional power grids, making it ideal for deployment in remote areas, disaster-affected regions, and developing economies with limited infrastructure.

Its modular design ensures flexibility, allowing users to scale operations from individual units to large-scale implementations that meet industrial and agricultural needs. The ENERTOPIA RAINMAKER relies solely on solar energy, providing a cost-effective and environmentally friendly alternative to energy-intensive desalination methods.

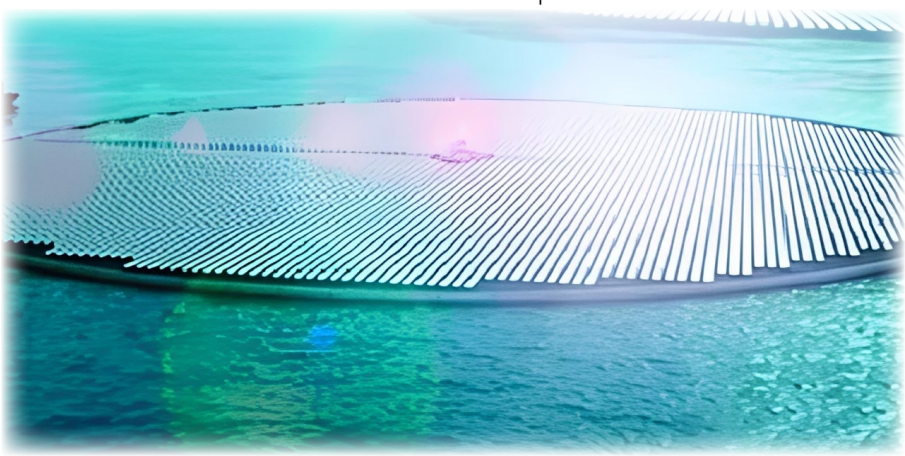
How does it work?

The ENERTOPIA RAINMAKER system works by extracting moisture from the air through a combination of heat exchange and condensation. This technique is especially effective in arid coastal and monsoonal regions, where dew points are close to ambient air temperatures, enhancing moisture extraction efficiency. In contrast to traditional desalination, which demands extensive infrastructure, high operational costs, and significant energy consumption, Enertopia's patented solution is decentralized, scalable, and adaptable to various climates.

The system is designed to integrate with photovoltaic (PV) panels, serving a dual purpose: generating electricity during the day while absorbing heat and facilitating water production during the cooler nighttime hours.

Under optimal conditions, it can produce between 5,288 to 10,376 gallons of water per hour for each megawatt (MW) of installed solar capacity.

The modular design of the ENERTOPIA RAINMAKER enables its use in both small-scale off-grid applications and larger commercial or agricultural projects, providing exceptional flexibility in implementation.



Worldwide Potential

The data from four locations, including Tonopah, NV, where the West Tonopah Lithium project is situated, highlights the potential for water extraction through solar energy. At maximum production, Tonopah can extract up to 5,466 gallons of water per hour per megawatt (MW) of solar array. Factors influencing this data include humidity levels, ambient air temperature, and dew point.

Moisture in the air is measured in grains per pound of dry air, and condensation occurs at dew point temperatures, typically at night. During the day, ambient heat extracts moisture from surrounding environments, allowing the heat recovery system to collect this moisture effectively. The moisture collection layer is strategically positioned between the PV panel and the liquid transfer system to optimize heat transfer. In cases where natural moisture formation is insufficient, the system may use controlled water emission to ensure saturation.

"We look forward to the next steps of solving real world energy and water problems," states President Robert McAllister

CONCLUSION

In conclusion, water scarcity remains a critical issue, particularly for industries and agriculture that heavily rely on this vital resource. As traditional water sources become increasingly strained, innovative solutions like Enertopia's technologies emerge as essential alternatives. The company's advancements in water production through solar energy, such as the ENERTOPIA RAINMAKER, provide a sustainable and cost-effective approach to address pressing water needs. By harnessing atmospheric moisture and integrating it with renewable energy, Enertopia not only enhances water security but also contributes to environmental sustainability. As the demand for decentralized and efficient water solutions grows, Enertopia stands poised to make a significant impact on global water challenges.

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Innovations in Energy Efficiency for Desalination: Expert Insights from Sacyr/ Water, ACCIONA, Brine Consulting, and WEG

In our environmentally conscious world, there is a growing focus on enhancing energy efficiency across various sectors, driven by the desire for positive environmental impact and potential cost savings. Desalination processes, in particular, stand to gain significantly from improved energy efficiency, especially in the face of increasing water scarcity and rising energy costs. The industry is actively seeking innovative solutions to optimize energy consumption and ensure long-term sustainability. This article aims to unite key industry leaders to explore the latest technological innovations, strategies, and best practices that are shaping energy-efficient desalination. Experts from leading water companies and technology providers will share valuable insights on enhancing efficiency in desalination processes, addressing everything from high-level system design to advanced energy-saving equipment, ultimately paving way for a more sustainable future in water management.

Sacyr Water: Current Landscape, challenges and future trends

Nearly half of the global population faces water shortages, with over 800 million lacking clean drinking water and 2.2 billion without safe supplies. As the population is projected to reach 9.8 billion by 2050, advanced water technologies are essential. Water desalination has emerged as a key solution, employing methods like heating and reverse osmosis to remove salt and impurities. With over 20,000 desalination plants producing around 25 billion gallons of water daily, most are concentrated in the Middle East and North Africa. The global desalination market is expected to reach $37 billion by 2032, showcasing significant programs in Saudi Arabia and the USA.

> “Many contries have Desalination programs. The largest desal programs are in Saudi Arabia, Emirates and USA. 7 of the largest 20 desal companies are Spanish, demonstrating the strength of our industry expressed Dr. Domingo Zarzo”

Innovation and Strategic Projects Manager at Sacyr Water & President of AEDyR.

What are Facts and Myths Sea Water RO Desalination?

However, amidst the growing interest in desalination, numerous myths and misconceptions have arisen. In this view, Dr. Zarzo debunks some of the common myths surrounding desalination and sheds light on the realities of this vital process.

Myths

- Desalination is energy intensive.

Desalination has a strong impact in marine environment.

- Desalinated water is very expensive.

Facts

• Desalination does NOT consume a lot of energy

Energy for producing desalinated water for a family of 4 for 1 year is equivalent to the energy consumption of their refrigerator (3 Kw.h/m³, 0.003 Kw.h/liter). For an average daily consumption of 600 liters, the daily electricity usage would be 1.8 kWh, similar to an air conditioner's energy consumption for 1-2 hours.

• Desalination does NOT significantly impact the marine environment

Studies show that brine discharge from desalination plants does not harm the marine environment. The brine discharge point is simply seawater again, just a few meters away from the discharge point.

Dilution and diffusion systems ensure that the concentrate matches seawater salinity shortly after discharge.

• Desalinated water is NOT expensive

Currently, the cost of producing desalinated seawater ranges from 0.5 to 1.0 euro per cubic meter, while desalinating brackish water costs between 0.3 and 0.5 euros. This includes infrastructure, operation, maintenance, and energy costs. In terms of liters, Compared to bottled water, desalinated water costs less than 0.001 €/liter, while bottled water costs 500-1,000 €/m³ and consumes 30 Kw.h/m³

Improving Energy Efficiency in Desalination

Desalination plants require more energy than conventional water treatment facilities, primarily using the Reverse Osmosis (RO) process to remove salt from seawater or brackish water. The RO process involves multiple stages, including pumping, filtration, and mineral addition, with high-pressure pumps that consume substantial electrical energy. Energy costs account for 50-60% of total water production expenses in desalination, influenced by factors like technology (evaporation, membranes), salinity, and the distance between intake and distribution points influence energy consumption.

Over the past 50 years, the desalination industry has made significant strides in reducing specific energy consumption, achieving a tenfold decrease from approximately 25 kWh/m³ in the 1970s to around 3 kWh/m³ today.

This reduction is attributed to advancements in technologies like Multi-Stage Flash (MSF), Vapor Compression (VC), and RO, as well as improvements in energy recovery devices. Early devices like Francis Turbines offered about 75% efficiency, while Pelton Turbine Wheels reached 85%. Modern technologies include Turbochargers, achieving around 80% efficiency, and Isobaric devices like Pressure Exchangers (PX), which can reach up to 97% efficiency. Dual Work Exchanger Energy Recovery (DWEER) also provides high-efficiency alternatives, further enhancing sustainability and cost-effectiveness in modern desalination processes.

What Does the Future Hold?

Key strategies for reducing energy consumption involve the development of innovative membrane materials, optimized configurations for Reverse Osmosis (RO), improved pretreatment processes, and the use of efficient equipment. Furthermore, the integration of new technologies, such as artificial intelligence for optimization and energy recovery from brines, plays a vital role in enhancing energy efficiency. While AI is currently utilized for predictive maintenance and process control, panelists indicated that future desalination plants may increasingly depend on autonomous operations, with AI-driven optimization of energy usage and real-time adjustments to boost efficiency.However, despite these advancements, future reductions in energy consumption may be constrained since the thermodynamic limit is estimated to be approximately 1 kWh/m³. This suggests that while improvements will persist, substantial additional reductions are unlikely.

> “Can we anticipate a significant further decrease in energy consumption? No, the thermodynamic limit is around 1 kWh/m³, explained Dr. Zarzo.”

ACCIONA: How to Boost Energy Efficiency of Desalination Plants

As a leader in sustainable desalination, ACCIONA employs reverse osmosis, the most efficient technology for providing fresh water in water-stressed regions, resulting in 6.5 times fewer CO_2 emissions than conventional methods in the Middle East and Africa.

The company operates desalination plants capable of treating about 7 million m³/day, supplying water to approximately 32 million people. Their expertise covers the entire project lifecycle, integrating innovative strategies from their R&D department. Miguel Aritio, Director of Energy Resources & Business Development North Africa at ACCIONA, discusses energy optimization strategies in large-scale desalination projects.

Challenges and Strategies for Sustainable Operations

Energy consumption in desalination plants significantly affects operational costs, comprising up to 40% of the cost per cubic meter of water produced over the plant's lifespan, compared to 30% for conventional water treatment facilities. Understanding the energy dynamics of these facilities is essential for optimizing desalination processes, especially amid increasing global water scarcity.

Key Characteristics of Water Treatment Facilities

- High Consumption: These facilities demand substantial energy to operate various equipment and processes.
- Flat Line of Consumption: They maintain a relatively constant energy demand, which can facilitate better alignment with renewable energy sources.
- High Voltage Feeders: The need for high voltage electrical feeders is essential to power the equipment effectively.

The predictable energy demand associated with these facilities can be advantageous for integrating renewable energy, as it allows for a more consistent match between energy supply and demand. However, the reliance on high voltage presents challenges, particularly since many renewable energy sources generate electricity at lower voltages. This necessitates careful planning and technical adjustments to ensure effective integration into desalination infrastructure.

Integrating renewable energy, such as solar and wind, adds complexities, including low voltage generation, lower energy density necessitating larger installations, and the intermittent nature of renewable energy requiring robust management strategies.

To fully leverage renewable energy in desalination, it is crucial to address challenges related to power conversion, energy storage, and load balancing, thereby enhancing energy efficiency and sustainability in operations.

ACCIONA's Energy Supply Sources

To tackle energy supply challenges in desalination, Aritio highlighted three primary strategies shaping the industry, with ACCIONA offering diverse energy options from both onshore and offshore sources.

- Onshore Energy: Desalination plants increasinglyutilize solar photovoltaic (PV) systems, which can fulfill up to 20% of their energy needs under optimal conditions. However, land constraints limit scalability, as each hectare of a desalination facility requires at least five hectares of PV panels to achieve energy targets.
- Offshore Energy: Offshore energy generation provides greater technological flexibility and capacity.

Power Purchase Agreements (PPAs) allow desalination operators to secure long-term contracts with independent power producers, facilitating access to clean energy without on-site generation. This model has been successfully implemented in Spain and Australia, where national grids support renewable energy for desalination.

- Net Balance: This strategy optimizes energy generation and consumption by integrating both onshore and offshore sources. Hybrid systems incorporating energy storage are becoming common, with projects exploring integrated battery storage and smart grid solutions. Additionally, producing hydrogen from ex

cess renewable energy can aid in the long-term decarbonization of desalination processes, enhancing industry sustainability.

Brine Consulting: Brine management in desalination industry

Effective brine management is essential for water security in the desalination industry. Currently, desalination produces about 95.37 million cubic meters of water daily, with brine concentrations around 75 g/L, addressing the energy demands of brine treatment is crucial, as it can account for up to 30% of global electricity use. Christos Charisiadis, Founder & Principal Consultant at Brine Consulting, discusses sustainable approaches to brine management and resource recovery in Desalination.

Novel Technologies for Concentration of Brine

Recent advancements in membrane-based systems have revolutionized brine management in desalination, enhancing efficiency and sustainability.

> Key technologies include Membrane Distillation (MD) at 25 kWh/m³ (up to 250 g/L), Osmotically Assisted Reverse Osmosis (OARO) at 10-15 kWh/m³ (210-233 g/L), and Electrodialysis Reversal (EDR) at 12-15 kWh/m³ (200 g/L).

These methods offer lower energy consumption and higher recovery rates compared to traditional thermal processes. Hybrid configurations, such as SWRO combined with Electrodialysis or Membrane Distillation, can achieve brine concentrations up to 250 g/L and reduce energy use by 80%, exemplified by the Electrodialysis-Evaporator Hybrid in Kuwait. which achieves 90.58% salt purity and efficient recovery, demonstrating effective brine management and sustainability in desalination processes.

Brine: from waste to resource

The principles of a circular economy and brine valorization present significant economic and resource recovery potential in the desalination context.Key recovered materials and their market values include:

- Magnesium (Mg): $5-$6/kg, used in aerospace, automotive, and battery industries.
- Bromine (Br): $3-$5/kg, used in flame retardants and pharmaceuticals.
- Lithium (Li): $410-$450/kg (metal), $4-$10/kg (carbonate), used in electric vehicle batteries and energy storage.
- Sodium Chloride (NaCl): $0.03-$0.1/kg, used for industrial purposes.Real-world projects highlight this viability, such as magnesium recovery in Saudi Arabia, offsetting desalination costs by $8-12 per cubic meter, and the Dead Sea's bromine extraction, meeting 85% of global demand.These initiatives demonstrate desalination's potential in the circular economy, transitioning from a costly operation to a financially beneficial one.

WEG : Efficient motors vital for desalination plants

Motors are essential to the operation of desalination plants, as highlighted by Josis Rivas, WEG's Water and Wastewater Global Manager. With energy costs comprising up to 50% of operational expenses, optimizing motor performance is crucial for efficiency. Reducing energy consumption not only lowers operational costs but also decreases CO2 emissions, supporting environmental goals. As governments and utilities push for sustainable solutions, WEG stands out as a leader in motor and electrical system solutions, providing technologies that enhance energy performance and increase water availability, ensuring the long-term viability of desalination efforts worldwide.

- Key Applications in Desalination

Seawater Intake Pumps: These pumps transport large volumes of seawater to the plant, utilizing low voltage or high voltage motors based on the plant's capacity, specifically the W22 and W50 motors.

Pre-Treatment (Media & Cartridge Filters): This stage filters seawater before it reaches the membranes, employing systems like traveling screens, media filtration, DAF, or microfiltration pretreatments. It is powered by high-efficiency induction motors, along with geared motors, variable frequency drives (VFDs), and electrical panels.

Reverse Osmosis (RO) System

- High-Pressure Pumps (HPPs): As the most energy-intensive component, these pumps require high voltage motors, particularly the W60.
- Cartridge Booster Pumps (LPP): These pumps ensure optimal membrane pressure and minimize energy losses, utilizing MVW3000 or MVWD1 drives (VFD) and high voltage motors.
- Energy Recovery Devices (ERDs): These devices reduce wasted energy and are paired with WEG booster pump motors for enhanced efficiency.

WEG's Solution: High-Efficiency Motors & Automation

WEG's high-efficiency solutions, including IE3, IE4, and IE6 low voltage motors, significantly enhance energy efficiency in desalination plants, achieving up to 98% efficiency and minimizing energy waste. Custom-configured high voltage motors for high-pressure pumps (HPP) exceed 97% efficiency, effectively reducing Specific Energy Consumption (SEC). WEG's Permanent Magnet (PM) motors offer high power density, while new-generation axial and transverse flux motors are designed to use fewer materials without sacrificing performance. Advanced cooling systems ensure optimal operation in high-temperature conditions.Additionally, WEG integrates Variable Speed Drives (VSDs/VFDs) to adjust motor speeds based on demand, further lowering power consumption.

Smart sensors and remote monitoring enable predictive maintenance, enhancing reliability through technologies like Motion Fleet Management (MFM) with AI.

This comprehensive strategy boosts operational efficiency and supports sustainable water management, integrating seamlessly with renewable energy sources. In real-world applications, WEG has made notable contributions, such as the Atacama Region project in Chile, developed by ECONSSA. This initiative addresses water shortages by utilizing WEG's solutions, including W50 electric motors for pumping stations and W22 motors with IE3 efficiency for the desalination plant. All motors are coated with special epoxy paint for durability in harsh environments, ensuring optimal performance and maintenance for remote operations.

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Canadian Solar's e-STORAGE to Deliver 228 MW / 912 MWh Battery Energy Storage System for Colbún in Chile

Canadian Solar Inc. has announced that e-STORAGE, a subsidiary of CSI Solar Co., Ltd., has contracted with Colbún to supply a 228 MW / 912 MWh Battery Energy Storage System (BESS) for the Diego de Almagro Sur project in Chile's Atacama Region. Utilizing e-STORAGE's advanced SolBank 3.0 technology, the project will enhance performance and reliability through lithium-iron-phosphate (LFP) technology and a liquid cooling system. Construction starts in June 2025, creating up to 150 local jobs, with commercial operations expected by December 2026. This system will support approximately 55,480 households and strengthen grid stability, aligning with Colbún's vision for a secure, sustainable energy transition in Chile.

ACME Secures $140 Million in Landmark Green Hydrogen Project Funding at Duqm

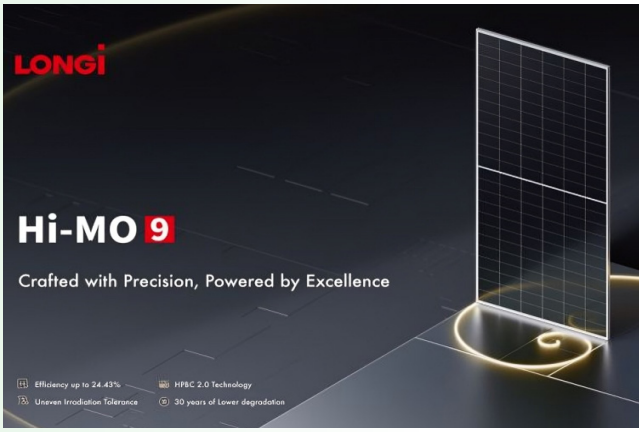
ACME Group has secured its first $140 million installment for its green hydrogen and ammonia project in Duqm's Special Economic Zone, part of a $540 million financing package covering 75% of the $750 million project cost. This initiative marks a significant milestone in Oman's energy transition and reflects international confidence in Sezad's investment potential. Dr. Saeed bin Khalifa Al Quraini noted its strategic importance as the first project in Oman to achieve full financial closure with a long-term off-take agreement. The project aims for an initial production capacity of 100,000 tonnes of green ammonia annually, expanding to 1.1 million tonnes, with operations expected to start by Q1 2027.

TotalEnergies Completes Key Acquisitions, Expands Global Renewables Portfolio across Europe, Africa, and Canada

TotalEnergies has completed its acquisitions of VSB Group, a European wind and solar developer, and SN Power, a leading hydropower developer in Africa, particularly Uganda. The acquisition of VSB Group enhances TotalEnergies' renewable energy capacity in Europe to over 40 GW, adding significant projects to its portfolio. In Africa, the acquisition of SN Power includes a 28.3% stake in the Bujagali hydropower plant, which meets over 25% of Uganda's electricity demand, and stakes in projects in Rwanda and Malawi. Additionally, TotalEnergies has signed agreements with RES to acquire over 800 MW of renewable projects in Alberta, Canada, further solidifying its commitment to renewable energy globally.

LONGi Solar Europe Powers LATAM Energy Shift with Key Utility-Scale Alliance

LONGi Solar has signed a groundbreaking agreement to supply over 100 MW of Hi-MO 9 modules for a utility-scale solar project across Latin America. Led by LONGi's European team, this collaboration highlights the company's expertise in back contact (BC) solutions, reinforcing Europe's position in global renewable energy. The project, developed with a major energy developer, utilizes Hi-MO 9 modules to tackle energy challenges in diverse climates, boasting an impressive efficiency of up to 24.8%. This initiative supports Latin America's decarbonization goals, enhancing grid stability and energy security. The BC architecture minimizes land use and ecological impact, with the project expected to offset over 120,000 tonnes of CO2 annually, powering around 60,000 homes while adhering to biodiversity protocols.



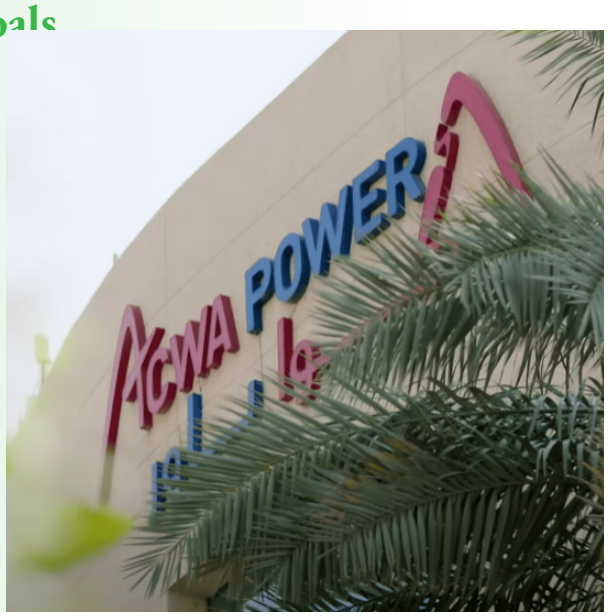
Shanghai Electric partners with Masdar and Mawarid for wind and solar projects

Shanghai Electric has signed two significant cooperation agreements with Oman's Mawarid Group and Abu Dhabi Future Energy (Masdar) in Saudi Arabia to enhance the region's energy transformation. The agreement with Mawarid focuses on wind power, covering turbine supply, technology transfer, and establishing a local factory to utilize Oman's wind resources and foster economic growth. This initiative aligns with Oman's Vision 2040 and aims to diversify its energy mix. The deal with Masdar involves the development of the 2GW Sadawi photovoltaic project, Shanghai Electric's largest solar project, which will generate over six billion kilowatt-hours annually, powering 700,000 households and significantly reducing carbon emissions.

Suzlon secures 378MW wind project with NTPC Green Energy in India

Suzlon, a wind turbine manufacturer, has secured a 378MW wind energy project from NTPC Green Energy (NGEL), expanding their partnership to a total of 1.54GW. This marks NGEL's second major order from Suzlon in eight months, with the project set to be executed in Karnataka's Gadag region. Suzlon Group CEO JP Chalasani emphasized that securing high-quality projects in the public sector is crucial for their growth strategy, showcasing their ability to provide reliable solutions that support India's clean energy objectives. The contract includes the supply of 120 S144 wind turbine generators, each with a capacity of 3.15MW and hybrid lattice towers, reinforcing Suzlon's role in India's renewable energy landscape.

ACWA Power Secures SR750 Million Loan for Riyadh HQ, Advancing Saudi Arabia's Energy Transition Goals



ACWA Power, the world's largest private water desalination company, has secured a Shariah-compliant term loan of SR750 million (approximately $119 million) from Alinma Bank to construct its new headquarters in Riyadh. This seven-year loan reflects the bank's confidence in ACWA Power's financial stability and its role in supporting Saudi Arabia's Vision 2030 and energy transition goals. The new headquarters aims to centralize operations and promote innovation, featuring eco-friendly workspaces. ACWA Power's CFO, Abdulhameed Al-Muhaidib, emphasized the project's significance for sustainability and the Kingdom's future. In 2024, ACWA Power reported a net profit of SR1.75 billion, driven by increased revenue from operations and electricity sales, and signed agreements with Aramco to advance renewable energy initiatives. T

Fervo and Shell Energy sign PPA for 31MW geothermal power in Utah

Fervo Energy has signed a 15-year power purchase agreement (PPA) with Shell Energy North America for 31MW of geothermal power from its Cape Station project in Utah, the largest enhanced geothermal systems development globally, set to operate in 2026. This agreement marks Shell Energy as the first offtaker from phase one of the project, enhancing its renewable portfolio with zero-emission geothermal energy. The Cape Station's capacity will increase from 400MW to 500MW due to advancements in well design and field development. Fervo's geothermal power aligns with California's mandate for 1GW of non-weather-dependent energy and supports the Biden administration's carbon-free power goals by 2035.

Ameresco SUNEL Energy SA Plans 466 MWp Solar Projects To Energize Romania's Renewable Future

Ameresco SUNEL Energy SA, a joint venture between Ameresco, Inc. and SUNEL Group, has secured €303.4 million in Engineering, Procurement, and Construction (EPC) contracts for three large-scale solar parks in southwestern Romania, totaling 466 MWp. This initiative supports Romania's strategy to enhance energy security, promote economic growth, and reduce carbon emissions, particularly by phasing out coal by 2032. As the EPC contractor, Ameresco SUNEL will oversee all project phases, ensuring efficiency and environmental performance. The solar parks will utilize over 757,000 fixed-tilt solar modules, reducing CO_2 emissions by approximately 734,789 tonnes annually. Expected to be completed within 18 months, these projects will significantly contribute to Romania's renewable energy goals and position the country as a leader in Europe's clean energy transition.

Iberdrola, Kansai finalise $1.45bn offshore wind partnership in Baltic Sea

Iberdrola, the Spanish electric utility, has finalized a strategic agreement with Japan's Kansai Electric to co-invest in the 315MW Windanker offshore wind farm in the Baltic Sea, valued at €1.28 billion. Iberdrola will hold a 51% stake and manage operations, including maintenance services. The project, featuring 21 turbines with 15MW capacity each, is expected to be operational by late 2026 and has secured long-term contracts for its output, ensuring stable revenue. This partnership also includes collaboration in Electricity North West, a UK distribution company. The agreement aims to enhance electrification and renewable energy projects across various countries, supporting Iberdrola's growth and decarbonization efforts.

JA Solar Partners with NSEG to Supply 150MW of High-Efficiency PV Modules, Advancing Rooftop Solar Growth in Australia

JA Solar has signed a strategic Memorandum of Understanding (MoU) with NSEG, a leading rooftop solar PV provider in Australia, to supply 150MW of high-efficiency PV modules in 2025. This partnership aims to accelerate the adoption of renewable energy in Australia, leveraging NSEG's extensive network and customer-focused approach. NSEG has deployed over 60,000 PV systems across various sectors, making it a key player in delivering sustainable energy solutions. JA Solar's DeepBlue 4.0 Pro modules are designed for efficiency in diverse conditions, ideal for Australia's varied landscapes. With over a decade of presence in Australia, JA Solar is committed to innovation and collaboration, including a joint research lab with UNSW and a 1GW supply agreement with OSW, reinforcing its dedication to the country's clean energy transition.

NovaSource and Doral Renewables to Build One of the US' Largest Agrivoltaics Projects in Northwest Indiana

NovaSource Power Services, the largest global solar operations and maintenance (O&M) provider, has partnered with Doral Renewables to support the Mammoth Solar Project in Indiana. This significant agrivoltaic initiative will generate nearly 1.6 gigawatts (GWdc) of renewable energy while allowing agricultural activities to continue, benefiting local farmers. The project will be developed in four phases, with Mammoth North (480 MWdc) completed in late 2024, and the remaining phases expected to be operational by 2026. NovaSource will manage O&M and serve as Generator Operator, ensuring compliance and optimal performance. The project exemplifies sustainable energy development, integrating solar power with agriculture and setting a benchmark for future initiatives in renewable energy and land use efficiency.

Global Energy Events

Energy Storage Summit USA

Date: From 26 to 27 March, 2025
Location: Renaissance Dallas Addison Hotel, Dallas Texas

2025 is set to unleash a new wave of opportunity with a strong demand momentum of 62 GW of projected storage additions deployed by 2024 and a record number of projects coming online. California has now well-surpassed 13GW of grid-scale energy storage installations, ERCOT continues to go from strength to strength and notable markets in the Midwest and the Southeast are opening up to new deployment opportunities.

Website: storageusa.solarenergyevents.com

The 13th Energy Storage International Conference and Expo 2025 (ESIE 2025)

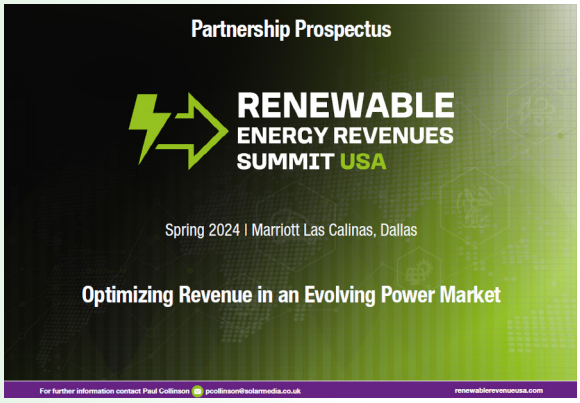
Date: From 10 to 12 April , 2025
Location: Beijine – New China International Exhibition center phase 2

Developed in 2012 by the nation's leading energy storage industry organization, the China Energy Storage Alliance (CNESA), the 13th ESIE in 2025 is the largest, most professional, and international energy storage event in China, acclaimed as the barometer and indicator for the development of the industry.

Website: my.esexpo.org

Renewable Energy Revenues Summit USA 2025

Date: From 23 to 24 April, 2025
Location: Dallas, Texas, USA



To bring buyers and sellers of power together, the Renewable Energy Revenues Summit USA will cover strategies to optimize renewable energy trading, procurement, and offtake structures across U.S. markets.

Website: renewablerevenueusa.com

Large Scale Solar USA 2025

Date: From 29 to 30 April, 2025
Location: Marriott Dallas Las Colinas, Dallas, Texas, USA

Nestled in Dallas, Texas, Large Scale Solar USA Summit is the nexus for project developers, capital providers, utilities, asset managers, and policymakers. Dive deep into the solar industry's transformative growth, learn from the best, and discover strategies to boost utility-scale solar deployment nationwide.

Website: lssusa.solarenergyevents.com

Intersolar Europe 2025

Date: From 7 to 9 May, 2025
Location: ICM München, Munich, Germany

As the world's leading exhibition for the solar industry, Intersolar Europe demonstrates the enormous vitality of the solar market. For more than 30 years, it has been providing a networking opportunity for the key players – from manufacturers, suppliers and distributors to installers, service providers, project developers, planners and start-ups – all under the motto "Connecting Solar Business". It focuses on the latest trends, developments and business models.

Website: www.intersolar.de

Renewables Procurement and Revenue Summit

Date: From 21 to 22 May, 2025
Location: Hilton London Tower Bridge, UK

Revenues Summit serves as the European platform for connecting renewable energy suppliers to the future of energy demand. This includes bringing together a community of European off-takers, renewable generators, utilities, asset owners, and financiers.

Website: renewablerevenue.co.uk

The Battery Show Europe 2025

Date: From 3 to 5 June, 2025
Location: Messe Stuttgart Stuttgart, Germany

Meet battery manufacturers, suppliers, engineers, thought leaders and decision-makers for a conference and battery tech expo focused on the latest developments in the advanced battery and automotive industries.

Website: www.thebatteryshow.eu

PV ModuleTech USA 2025

Date: From 17 to 18 June, 2025
Location: Napa, USA

The event will gather the key stakeholders from solar developers, solar asset owners and investors, PV manufacturing, policy-making and and all interested downstream channels and third-party entities. The goal is simple: to map out the PV module supply channels to the U.S. out to 2026 and beyond.

Website: www.pvtechconferences.com/pv-moduletech-usa

UK Solar Summit 2025

Date: From 1 to 2 July, 2025
Location: Leonardo Royal Hotel London Tower Bridge, London

UK Solar Summit 2025 will look at the role solar currently plays in the energy mix, how this will change over the coming years and how this aligns with net-zero and other government targets.

Website: uss.solarenergyevents.com

Large Scale Solar Southern Europe

Date: From 16 to 17 September, 2025
Location: Athens, Greece

The Southern European solar market has entered a transformative phase, with Greece leading ambitious expansion through its 2030 target of 15GW solar capacity, while Turkey has emerged as a manufacturing powerhouse for solar components.

Website: lssse.solarenergyevents.com

Green Hydrogen Summit USA 2025

Date: From 30 September to 1 October, 2025
Location: The Westin Hotel, Seattle, USA

The hydrogen industry is at a pivotal moment in its evolution. The groundbreaking policy advancements of 2023, including the introduction of 45V tax credits under the Inflation Reduction Act (IRA) and the allocation of $7 billion for regional clean hydrogen hubs through the Bipartisan Infrastructure Law, have set new benchmarks for the sector.

Website: greenhydrogenusa.solarenergyevents.com

Future Energy Asia

Date: From 2 to 3 December, 2025
Location: Rome, Italy

Our 2025 edition will focus on three core themes: Revenue & Trading, the Lifecycle of the Battery, and Optimization Tools for Success. 2025 will see markets such as the Nordics, Iberia, Italy, Germany, UK & Ireland, and the Benelux region, all with market deep dives, helping you to understand how you can position yourself as the front runner with all things Battery Asset Management.

Website: batteryeurope.solarenergyevents.com

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