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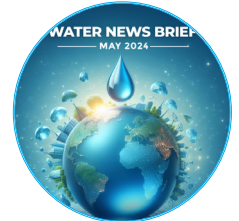
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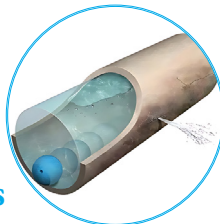
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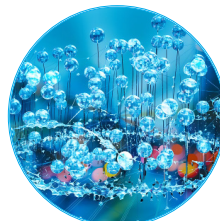
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# Mapping the Frontiers of Sustainability

Shaping Our Global Future- May 2024 Aqua Energy Expo Magazine Issue



**Mohamed Khalifa**  
Founder and CEO

Welcome to our latest magazine issue, where we embark on a journey through interconnected global challenges and innovative solutions shaping our world today.

Explore with us the significance of cybersecurity for critical water infrastructure worldwide, the challenges encountered, and strategies to mitigate cyber-attack risks. Discovering together the drone technology which is a transformative innovation that is reshaping the field of groundwater exploration. Now, let us delve into the intricacies of monovalent salt separation, where innovation meets necessity. From the sun-kissed shores to the heart of desalination plants, our journey begins.

Water leaks in Qatar result in the loss of significant volumes of water annually, leading to economic repercussions and increased water wastage. know more about the use of Smart-Ball technology has demonstrated substantial cost savings and long-term benefits, offering a promising solution for Qatar's sustainable resource management and water conservation efforts. Uncover the exploration of the transformative impact of Digital OneWater through real-world projects and collaborations, showcasing its potential to empower utilities as insights-driven organizations in efficiently managing water resources amidst a changing world. we will discuss the switch to green wastewater infrastructure which is presenting a compelling opportunity for municipalities and businesses to drive significant environmental and financial benefits. By investing in eco-friendly treatment systems, organizations can reduce their carbon footprint by up to 15% and unlock operating cost savings of 30% or more over the long term. by 2050 amidst rising global carbon emissions, emphasizing policy changes and renewable energy deployment. the significance of

reducing individual carbon and water footprints through sustainable practices, highlighting the importance of environmental conservation and proactive steps for a healthier planet. In the face of increasing water scarcity, renewable desalination presents a promising and sustainable solution for fresh water production, so our article focuses on using renewable energy for water desalination, especially in the Middle East and Northern Africa (MENA) where desalination is vital for water supply.

By harnessing renewable energy sources and advancing desalination technologies, we have the potential to provide clean water to communities around the world while minimizing environmental impact. So, we delve into the innovative technologies and strategies that transform waste into watts, offering a glimpse into a future where every drop counts in powering our world.

The demand for data storage and processing capabilities continues to surge. As organizations strive to meet this escalating need, the focus on future-ready data centers has become paramount. So our article delves into the significance of future-ready data centers and explores the sustainable design strategies that underpin their reliability and continuity.

In this comprehensive guide, we will delve into the what, why, and how of sustainable investing, and present an actionable roadmap for making your investments more sustainable

Join us as we navigate through these critical topics, exploring their interconnected nature and envisioning a more sustainable and resilient future for generations to come.

Best Regards ,

*Mohamed Khalifa*

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**Is the Security of Water Infrastructure  
at Risk from Cyber Threat ?**

**This article will examine the significance of cybersecurity for critical water infrastructure worldwide, the challenges encountered, and strategies to mitigate cyber-attack risks**

Recently, the global focus on cybersecurity for essential water infrastructure has intensified. As one of the most vital resources, access to clean and safe water is indispensable for human survival. Consequently, safeguarding water infrastructure from cyber-attacks is paramount. Given the cyber exposure of critical infrastructure globally, now is the time to implement cybersecurity for water and wastewater facilities to ensure their cyber-physical systems (CPS) are protected.

### Importance of Cybersecurity for Vital Water Infrastructure

Water infrastructure plays a crucial role in delivering clean and safe water to people worldwide. This infrastructure includes water treatment plants, distribution systems, dams, and reservoirs. Any disruption to this infrastructure can have severe consequences, including water shortages, public health risks, and even loss of life. Therefore, it is essential to secure water infrastructure from cyberattacks, which can cause grave damage to the system and the societies that depend on it.

**“ Water infrastructure is increasingly connected to the internet, which makes it vulnerable to cyberattacks ”**

Hackers can use malware and other techniques to gain unauthorized access to water infrastructure and disrupt the system’s operation. In recent years, there have been several incidents of cyberattacks on water infrastructure worldwide.

### Water & Wastewater Cybersecurity Incidents on the Rise

Water and wastewater cybersecurity incidents are on the rise, posing increasing risks due to technical errors, cyber-crime, espionage, “hactivism,” terrorism, and warfare. According to a study, cyber-crime costs over \$1.1 million and impacts 1,800 people every sixty seconds, with 22.9 phishing attacks and 1.5 ransomware victimizations per minute.

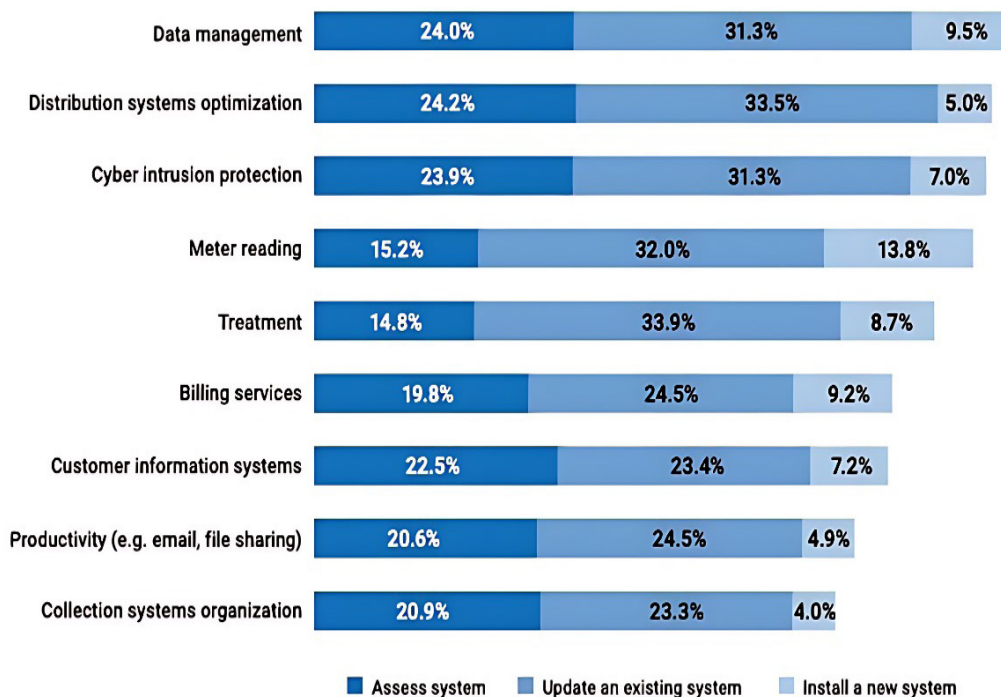
**“ The US government has prioritized securing critical infrastructure, especially after cyber incidents targeting the water and wastewater sector ”**

Recent attacks include an intrusion at a Florida water utility, ransomware attacks on sewage treatment plants in Maine, and an Iranian-backed group’s disruption of water pressure control systems in Pittsburgh. In November 2023, pro-Iranian hackers allegedly breached the computer systems of a water utility in Pennsylvania, although no operational impact was reported. In 2024, Velia North America’s Municipal Water division suffered from ransomware attacks, affecting billing systems. According to analysis from GHD about a quarter of global water systems could experience a cyber-security breach by 2025.

### Cybersecurity Threats to Water Infrastructure

One of the most significant dangers to water infrastructure is posed by cyberattacks, which have the potential to compromise the security of the system and even inflict physical harm on the infrastructure.

Utilities’ planning, revising, and assessing IT needs



In 2024, Veolia North America's Municipal Water division suffered from ransomware attacks, affecting billing systems. According to analysis from GHD about a quarter of global water systems could experience a cyber-security breach by 2025.

## Cybersecurity Threats to Water Infrastructure



One of the most significant dangers to water infrastructure is posed by cyberattacks, which have the potential to compromise the security of the system and even inflict physical harm on the infrastructure. Hackers employ various techniques, such as phishing emails, social engineering, and brute force attacks, to gain unauthorized entry to water infrastructure. Upon gaining access, hackers can pilfer data, disrupt operations, and even manipulate the chemistry of the water. An emerging threat is the ability of hackers to target operational technology (OT) systems using AI, like ChatGPT, to generate the complex code necessary for the “payload” that manipulates the system and serves as the primary objective of the cyberattack. Previously, only hackers with substantial resources and large teams could target such systems.

## Critical Cybersecurity Vulnerabilities in Water Infrastructure

Of the 16 critical infrastructure sectors identified by CISA, water and wastewater face some of the most unique challenges. While there are numerous large water and wastewater corporations, the majority are smaller entities that operate at the county, municipality, or township level. Consequently, many of these facilities are at a significant disadvantage in terms of cyber expertise, control environments, and staffing for facility protection.

**“ Asset owners and operators primarily prioritize operations, infrastructure maintenance, regulatory compliance, and revenue generation, often relegating cybersecurity to a lower priority compared to basic operational requirements ”**

Here are three primary cybersecurity vulnerabilities that water facilities encounter:

- **Lack of Asset visibility**

Water and wastewater utilities are inherently geographically dispersed with facilities and devices located

across the area they serve. The large physical footprint combined with the company's rapidly growing infrastructure to support population and business growth in the region, resulted in inconsistent documentation of OT assets and lack of full visibility into the OT environment to detect potential threats and vulnerabilities and mitigate risk.

- **Remote, unmanned facilities**

Water and wastewater facilities often operate unmanned, with employees and third-party vendors accessing systems for remote maintenance and data collection. Compromised access credentials or malware on authorized parties' systems can lead to system vulnerabilities. The lack of control over authorized access further increases the risk, as the company cannot ensure that only authorized parties are making agreed-upon changes to the appropriate systems.

- **Compliance with new Regulations**

As per the America's Water Infrastructure Act (AWIA), drinking water utilities are mandated to perform risk and resilience assessments and update emergency response plans. A comprehensive understanding of their OT network is essential. The water provider required enhanced visibility and data to adhere to the new requirement.



## Cybersecurity: A Collaborative Approach?

CISA advises water and wastewater (WWS) utilities to plan for cyber incidents in advance, with input from over two dozen organizations, including the FBI and the EPA. The guide, developed in collaboration with the FBI, U.S. EPA, and sector partners, offers best practices for cyber incident response and details federal roles, resources, and responsibilities across the response lifecycle. CISA emphasizes that the recommendations are not mandatory and do not cover all best practices or technical configurations. CISA encourages all water and wastewater utilities to use this incident response guide to augment their response planning before, during and after a cyber-incident. Familiarity with this guide will better prepare utilities to respond to — and recover from — a cyber-incident. Technical expertise is not required to understand and use the guide. It covers the incident response lifecycle in four stages:

- **Preparation**

Water and wastewater organizations should have an incident response plan in place, implement available services and resources to raise their cyber baseline and engage with the sector's cyber community.

- **Detection and Analysis**

Accurate and timely reporting and rapid collective analysis are essential to understand the full scope and impact of a cyber-incident. The guidance provides information on validating an incident, reporting levels, and available technical analysis and support.

- **Containment, Eradication, and Recovery**

While utilities are conducting their incident response plan, federal partners are focusing on coordinated messaging and information sharing, and remediation and mitigation assistance.

- **Post-incident Activities**

Evidence retention, using collected incident data, and lessons learned are the overarching elements for a proper analysis of both the incident and how responders handled it.

## Securing Water and Wastewater Facilities with advanced Solutions

Water and wastewater facilities face growing threats from remote attackers and insiders, leading to the need for plans to minimize control system exposure, address software vulnerabilities, secure remote access, and perform risk assessments. To ensure business continuity, adequate threat intelligence, and compliance with regulations, water and wastewater facilities implement the following cybersecurity solutions to protect their critical infrastructure:

- **Claroty's xDome**

Claroty's xDome is a modular, SaaS-powered industrial cybersecurity platform designed for water and wastewater facilities. It scales to protect their

environments, addressing cybersecurity goals as they evolve. xDome offers scalability, flexibility, and ease-of-use, catering to various network sizes, architectures, and user diversity. It ensures secure remote connections for employees and third-party vendors conducting maintenance and gathering operational data. Additionally, xDome seamlessly integrates with existing security solutions to extend cybersecurity controls and operational infrastructure.

- **Claroty's Continuous Threat Detection (CTD)**

Claroty's Continuous Threat Detection (CTD) offers water and wastewater facilities full spectrum OT, IoT, and IIoT visibility, continuous security monitoring, and real-time risk insights without impacting operational processes and devices. It supports the CPS cybersecurity journey, enabling facilities to identify threats and vulnerabilities in their OT network to ensure continued critical process operations. CTD seamlessly integrates with existing IT security infrastructure, detects anomalies and emerging threats, and helps facilities comply with industry regulations and standards, strengthening overall security posture.

- **Claroty's Secure Remote Access (SRA)**

Claroty's Secure Remote Access (SRA) solution protects industrial control systems (ICS) from threats introduced through unmanaged or unmonitored remote access by users like third-party vendors, contractors, and technicians. Purpose-built for OT, it offers user provisioning, role- and policy-based access controls, alerting, and the ability to audit, investigate, and terminate potentially malicious remote sessions. SRA is essential for facilities connected to critical assets online, enabling staff and third parties to access systems from anywhere. Additionally, SRA helps water and wastewater facilities comply with the AIWA mandate, providing the necessary risk and resilience assessment as per the new requirement.





# Charting New Frontiers: Drones' Impact on Groundwater Exploration

The ongoing drought affecting parts of Europe and other regions globally has strained groundwater resources due to high demand from various sectors like municipal, industrial, agricultural, and environmental users. To address this, groundwater exploration programs are now targeting deeper production zones ranging from 500 to 1000 meters underground, despite the steep costs involved, which can reach up to \$1 million per well. Here comes drone technology - a transformative innovation that is reshaping the field of groundwater exploration. Utilizing Drone technology can mitigate risks and unnecessary expenses by aiding in the strategic placement of wells in areas with the highest potential for water yield.

## Drones' Impact on Groundwater Research

Satellite imagery has significantly impacted surface hydrology, but its application in hydrogeology is limited due to the inability to directly observe groundwater from space. Remote sensing traditionally focuses on aquifer geological aspects like structure and lithology, relying on indirect indicators such as vegetation and surface characteristics combined with ground-based data. However, the emergence of drone technology is overcoming these limitations, revolutionizing hydrogeological research.

Drones offer advantages like enhanced spatial resolution, data collection in inaccessible areas, equipment versatility, cost-effectiveness, and survey flexibility.

*“ This technology is opening new horizons in hydrogeology research, providing a wealth of data and evolving sensor combinations ”*

The use of drones is transforming the field by addressing the shortcomings of satellite observations and ground-based measurements, offering a promising future for hydrogeological studies.

## Drone Technology is Reshaping Groundwater Exploration

Drones, also known as unmanned aerial vehicles (UAVs), offer a versatile platform for collecting high-resolution data over vast and often inaccessible terrains. Traditionally, exploring and mapping groundwater resources has been a challenging and labor-intensive endeavor. Nevertheless, the emergence of drone technology has brought about a new era, fundamentally transforming our approach to groundwater exploration.

### • Data Collection

Equipped with various sensors such as LiDAR (Light Detection and Ranging), multispectral cameras, and ground-penetrating radar (GPR), drones can gather precise information about the terrain, vegetation cover, and subsurface features. This data is invaluable for mapping aquifer characteristics, identifying potential recharge zones, and assessing groundwater quality.

### • Monitoring

Drones enable real-time monitoring of groundwater levels, allowing researchers to track seasonal fluctuations, identify trends, and detect anomalies. By combining aerial imagery with advanced analytics, stakeholders can gain insights into groundwater dynamics and make informed decisions regarding resource allocation and management strategies.

### • Mapping and Visualization

Geological mapping is a crucial component of groundwater exploration, and drones have significantly improved our ability to gather and analyze geological data. By combining drone imagery with advanced software and processing techniques, geologists can create detailed 3D models of the subsurface structure, identifying faults, fractures, and other geological features that influence groundwater flow and distribution.

## Types of drones for Groundwater exploration

Drones used for groundwater exploration can be classified into three main types: fixed-wing, multi-rotor, and hybrid. Each type of drone has its advantages and is chosen based on factors such as the terrain, desired resolution of data, and specific objectives of the groundwater exploration project.

### • Fixed-Wing Drones



Fixed-wing drones are designed like traditional airplanes with fixed wings. They are known for their efficiency in covering large areas during long-range surveys. Fixed-wing drones have longer flight times compared to multi-rotor drones, making them ideal for mapping extensive remote areas. These drones can carry heavier payloads and are more stable in windy conditions.

However, they require more space for takeoff and landing due to their need for a runway.

### • Multi-Rotor Drones

Multi-rotor drones, such as quadcopters or hexacopters, have multiple rotors that provide vertical takeoff and landing capabilities. They are versatile and can hover in place, making them suitable for short-range, high-resolution surveys in confined spaces or areas with obstacles. Multi-rotor drones are easy to maneuver and operate, offering flexibility in data collection at various altitudes. However, they have shorter flight times and limited payload capacity compared to fixed-wing drones.



### • Hybrid Drones

Hybrid drones combine features of both fixed-wing and multi-rotor drones to leverage their respective advantages. They can take off vertically like a multi-rotor drone and transition to fixed-wing flight for longer range and endurance. Hybrid drones offer the flexibility of vertical takeoff and landing along with efficient long-range capabilities, making them suitable for diverse groundwater exploration missions. However, they may be more complex to operate and maintain due to the combination of different technologies.





## UAV-borne LiDAR revolutionizing Groundwater Level Mapping

UAV-borne LiDAR offers a valuable alternative to traditional ground-based measurements by providing a greater number of piezometric observations in large or inaccessible areas without the need for prior leveling work. UAV-borne LiDAR measuring techniques allow for distance-based data collection without physical contact with wells, eliminating the need for permissions to access private land, particularly in conflict-prone regions with prevalent illegal water withdrawals. Rapid measurements at each well can be conducted within seconds, facilitating network densification based on hydraulic infrastructure availability. The swift data acquisition and deployment ensure high survey repeatability amid changing hydrological conditions. Additionally, this cost-effective approach is ideal for long-term monitoring of shallow hydrogeological systems and can be easily standardized.

## Monitoring Groundwater Salt Levels Using Prototype Octocopter Drones

The Current methods to monitor salt concentrations in groundwater involve a lot of field work, or expensive helicopter flights. Drones can be the solution for these limitations. They can carry all kinds of monitoring equipment over a reasonable distance and give a new dimension to aerial photography, at an affordable price. To address challenges posed by heavy monitoring equipment, Deltares and Aerial Innovate are developing a specialized octocopter prototype with a 4.5-kilogram carrying capacity. Equipped with GPS, the drone can autonomously survey areas and return, offering a promising solution for efficient groundwater monitoring.

- **Development of a mega drone**

Salt concentrations in groundwater are assessed using electromagnetic fields to measure conductivity, which increases with higher salt levels. A Ground Electro Magnetic device (GEM) generates the field with copper coils, determining salt concentrations based on the reflected signal and soil conductivity. Developing a drone capable of carrying heavy equipment, like the GEM, poses a challenge. Currently, a prototype octocopter supports the GEM, with propeller adjustments for balance. Operational limitations restrict drone use to designated airfields due to regulations. Future plans involve creating a larger drone capable of carrying 8 kilograms of equipment, potentially measuring 6 meters long, 2 meters wide, with 16 propellers.

## Advanced Drone Technology for Underground Water Detection in Italy

Italian experts are employing advanced drones to help farmers pinpoint underground water sources for irrigation. The team, comprising geophysicists, IT specialists,

and aeronautical scientists, deploys remote-controlled multi-rotor aircraft systems with electromagnetic sensors to efficiently scan the subsoil. In less than 20 minutes, they can detect water up to 250 meters deep across a wide area. Hydro Hunter Italia, a company specializing in underground water research using innovative drone systems, utilizes patented technology and probes to send electromagnetic waves into the soil, identifying density variations and anomalies. Through Bluetooth, operators receive alerts about these anomalies, highlighting areas with high water probability. Experts conduct orthogonal magnetic resonance in anomaly regions, generating color-coded subsoil maps. With an accuracy exceeding 85% in water source identification, this method supports farmers in locating underground water sources effectively amidst water scarcity challenges.

## Challenges and Considerations

Despite their numerous advantages, the integration of drones into groundwater exploration is not without its challenges:

- **Regulatory Hurdles**

Navigating airspace regulations and obtaining permits for drone operations can be a complex and time-consuming process, particularly in densely populated areas or near airports.

- **Data Processing and Interpretation**

The data collected by drones can be vast and complex, requiring specialized software and expertise for processing and analysis. The interpretation of drone-derived data, such as aerial imagery or geophysical surveys, can be challenging and may require advanced analytical techniques.

- **Battery Life and Range Limitations**

Most drones have limited battery life and range, which can restrict the area that can be covered during a single flight. This limitation can be particularly challenging in remote or inaccessible areas where groundwater exploration is often required.





# Harnessing the Sea's Wealth: The Dawn of Selective Salt Extraction

In the vast expanse of our planet, where oceans stretch to the horizon, lies a hidden treasure: seawater. Yet, this seemingly abundant resource remains tantalizingly out of reach due to its high salinity. Enter the Innovative System for Selective Separation of Monovalent Salts from Seawater Brine—a beacon of hope in the quest for sustainable water solutions. This groundbreaking technology promises not only to quench our thirst but also to unlock valuable resources from the depths of the ocean. As we embark on this scientific odyssey, let us delve into the intricacies of monovalent salt separation, where innovation meets necessity. From the sun-kissed shores to the heart of desalination plants, our journey begins.

## The Challenges of Seawater Brine:

Seawater brine, the highly concentrated saltwater by-product of desalination, poses a significant environmental challenge. Traditionally, this brine has been viewed as a waste product, with millions of gallons discharged back into the ocean daily, leading to detrimental effects on marine ecosystems due to increased salinity and the presence of chemical additives. The disposal of brine is not only a concern for ocean health but also represents a lost opportunity to capitalize on the valuable minerals dissolved within it.

However, innovative approaches are changing this narra-

tive. Advances in technology have enabled the extraction of minerals like lithium, magnesium, and potassium from seawater brine, transforming what was once waste into a treasure trove of resources. This shift not only mitigates the environmental impact of brine disposal but also contributes to the circular economy, where every by-product is a potential input for new processes.

The challenge now lies in scaling these technologies to handle the vast quantities of brine produced by desalination plants worldwide. As the demand for fresh water and critical minerals rises, the ability to turn seawater brine into a goldmine of resources could prove to be a pivotal solution for sustainable development.

## Variable Speed Drive : When is a VSD a Viable Solution?

In many setups, incorporating a variable speed drive (VSD) to run your pump(s) can lead to energy savings. However, this is not always the scenario. To determine if a VSD can help you save energy, understanding how the pump functions in relation to the system curve is crucial. The system curve represents the flow resistance in the system, and the pump always operates at the intersection of the system curve and the pump performance curve. Additionally, consider factors such as the affinity laws, specific energy, and whether the system operates with or without a static head.

## Unlocking the Secrets of Monovalent Salt Separation

In the quest to address global water scarcity and pollution, researchers and engineers are pioneering groundbreaking solutions. One such endeavor is taking place in NEOM, a new region being built in the Northwest of Saudi Arabia as part of Saudi Arabia's Vision 2030. NEOM aims to be a living laboratory for cutting-edge solutions, and its water and energy company, ENOWA, is at the forefront of innovation. ENOWA is designing water infrastructure that integrates renewable energy technology and circular economy principles. Seawater desalination is a key component, but ENOWA goes beyond mere desalination. Their system combines brine processing and 100% wastewater recycling, achieving zero-liquid discharge (ZLD) with no environmental runoff by 2030. This ambitious approach ensures that every drop of water is maximally utilized.

***“ One of ENOWA's latest technological achievements is the development of a system for low-cost harvesting of concentrated, high-purity minerals from seawater ”***

Unlike conventional seawater reverse osmosis (SWRO) systems that produce only desalinated water and mixed brine of no value, ENOWA's system extracts valuable minerals while producing desalinated water. This breakthrough has the potential to revolutionize water treatment technologies, reduce waste, and enhance sustainability worldwide.

Additionally, researchers have explored other methods for selective ion separation. For instance, thin-film composite nanofiltration membranes have been tailored to separate monovalent and divalent anions effectively. These membranes, based on oligo-ethylene-glycol units, exhibit enhanced cation affinity and tailored porous structures. By achieving high selectivity for monovalent and divalent ions, they contribute to resource recycling and environmental protection. Furthermore, the use of monovalent selective electrodialysis (S-ED) has been explored to separate and recover sodium chloride from SWRO brine. This approach avoids direct brine discharge and contributes to brine valorization, minimizing environmental impact

## Statistics of Innovative System For Selective Separation system

### • NEOM and ENOWA:

NEOM is envisioned as a future Special Economic Zone where cutting-edge solutions will be tested.

ENOWA, the water and energy company of NEOM, is leading the charge in developing sustainable water infrastructure.

The goal is to achieve zero-liquid discharge (ZLD) with no environmental runoff by 2030

ENOWA is collaborating with world-leading experts and research institutions to drive innovation.



### • Water Innovation Center (WIC):

ENOWA has established the Water Innovation Center (WIC) dedicated to applied research.

Strategic partnerships exist with institutions such as UCLA, Texas A&M University, Pennsylvania State University, and HACH in the US, as well as KAUST in Saudi Arabia and Hydranautics in Japan.

The aim is to create an ecosystem of technologies and equipment that benefit both NEOM's utility needs and wider global applications.

### • Membrane System for Selective Mineral Extraction:

The WIC has developed a system for low-cost harvesting of concentrated, high-purity minerals from seawater. Unlike conventional seawater reverse osmosis (SWRO) systems that produce only desalinated water and mixed brine, this system extracts a valuable mineral simultaneously.

It uses innovative SWRO membranes with embedded chemical ingredients in the salt separation layer, making the membrane semipermeable for water and the targeted mineral.

## NEOM: A Visionary Project

NEOM is a new region being built from the ground up in the Northwest of Saudi Arabia and is a key component of Saudi Arabia's Vision 2030. Envisioned as a future Special Economic Zone, NEOM aims to be a living .

***“ One of NEOM's primary goals is to develop and implement at-scale solutions for water scarcity and pollution while minimizing water costs and eradicating waste ”***

The role of the Innovative System for Selective Separation of Monovalent Salts from Seawater Brine for Beneficial Use in the NEOM project is pivotal and multifaceted. It serves as a cornerstone for NEOM's sustainability and economic goals, aligning with Saudi Arabia's Vision 2030. Here's how it integrates into the NEOM project:

### • Sustainability and Zero-Liquid Discharge

The system is integral to achieving NEOM's ambitious goal of zero-liquid discharge (ZLD) by 2030, which means eliminating environmental runoff. It supports NEOM's vision of a circular economy where waste is minimized, and every byproduct is seen as a potential resource.

### • Water Scarcity Solutions

By selectively separating monovalent salts, the system addresses water scarcity issues by providing an additional source of fresh water from seawater brine.

### • Economic Development

The system contributes to economic development by turning a waste product into valuable minerals, creating new revenue streams. It reduces the costs associated with brine disposal and environmental management.

### • Innovation and Collaboration

NEOM's Water Innovation Center (WIC) has developed this system in collaboration with leading international organizations and research institutions.

These partnerships foster innovation and position NEOM as a leader in sustainable water management technologies.

### • Global Water Industry Impact

The system not only benefits NEOM but also has wider global applications, potentially transforming the global approach to desalination and resource recovery.

It creates an impetus for water industry growth and sustainability, setting a precedent for other nations to follow.

## Conclusion:

The waves whisper secrets, and the tides carry ancient wisdom. In the wake of this innovative system, we stand at the crossroads of progress. The selective separation of monovalent salts from seawater brine is no longer a distant dream—it is a reality etched in the fabric of our future.

As we raise our chalices to toast this triumph, let us remember that every drop of desalinated water holds within it the promise of life, and every crystal of salt bears witness to human ingenuity. May the currents of innovation continue to flow, guiding us toward a world where scarcity yields to abundance, and where the salty embrace of the sea becomes a source of sustenance for generations to come.





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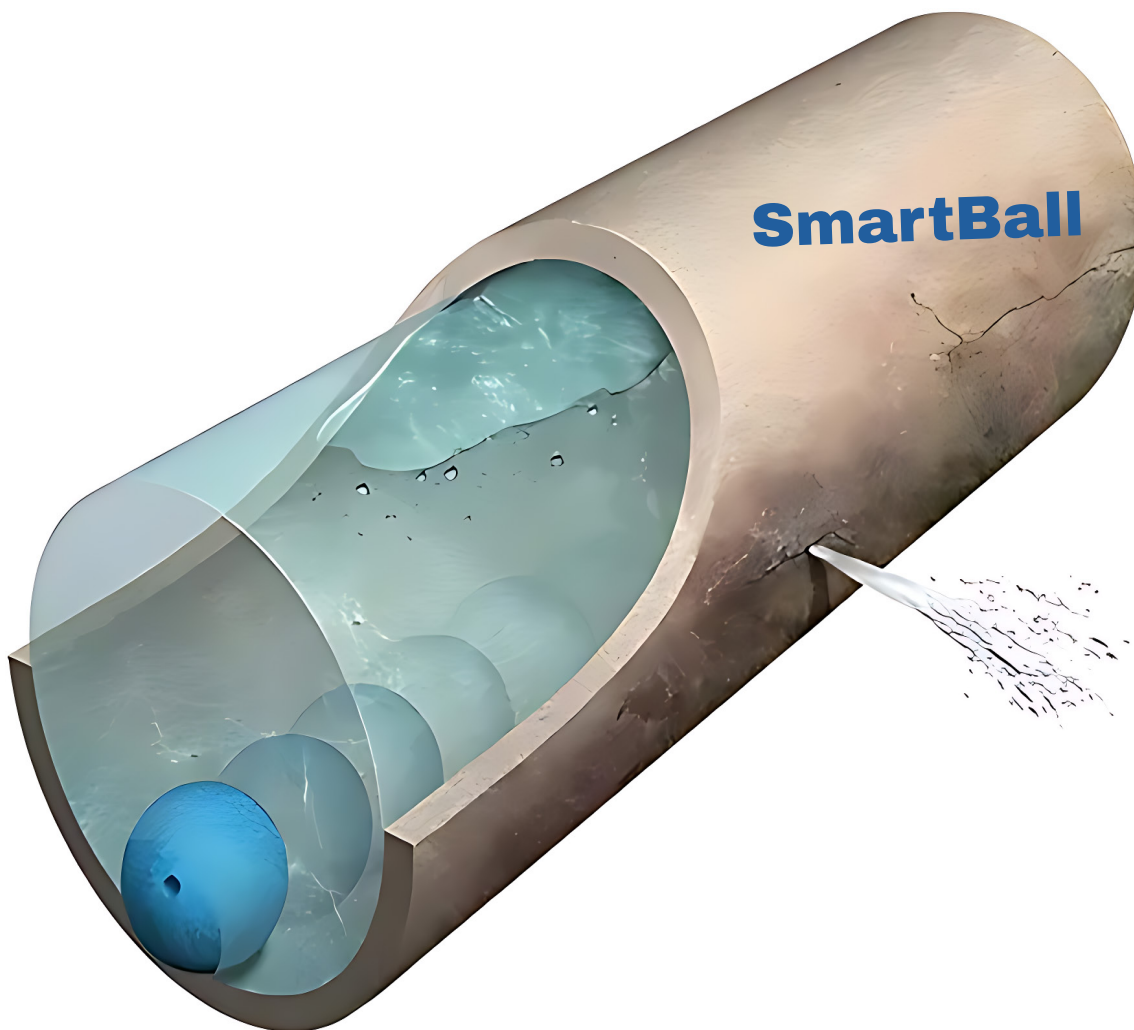
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# Xylem and Idrica provide an Engineering Service to detect Water Leaks in Qatar's Distribution Networks

xylem

 IDRICA



**The use of SmartBall technology has demonstrated substantial cost savings and long-term benefits, offering a promising solution for Qatar's sustainable resource management and water conservation efforts.**

**W**ater leaks in Qatar result in the loss of significant volumes of water annually, leading to economic repercussions and increased water wastage. With limited natural freshwater resources, the country heavily relies on desalination facilities, with 61% of its water supply coming from desalination. To address these challenges, Qatar has launched the Mega Reservoirs Project and implemented measures for water conservation and leak detection.

### Water Challenges in Qatar

Qatar faces several challenges to its limited and over-exploited water resources. These are described in more detail below.

- **Increasing Water Demand**

The rapid growth of industry and population in Qatar has strained its water resources. Water demand has significantly increased, reaching 1.9 MCM/d in 2019, and is projected to rise to 2.2 MCM/d in 2022. Qatar exhibits one of the highest domestic water consumption rates globally, at around 500 L/cap./d. High household water usage persists as a major issue, necessitating practical incentives like rebates or the replacement of high-efficiency appliances to lower domestic water consumption.

- **Inefficient Water Use and Network Loss**

The agricultural sector is the main user of groundwater. Agricultural water consumption accounts for 37% to 40% of total water resources from all sources and is used for the production of local crops, which meet only 8% of the national demand for food and fodder.

**“ Another challenge is low irrigation efficiency due to traditional irrigation methods ”**

With a lack of sufficient freshwater resources and a heavy reliance on desalination, water storage is a major concern. Qatar only has around a 48-hour storage supply of water in case of emergencies. The current capacity of Qatar’s desalination plants is around 540 MCM/yr, but approximately 30% of this volume is lost through network leaks, while the remainder is used for domestic purposes.

- **Exploitation of Groundwater Resources**

Qatar currently depends on seawater desalination to supply 99% of the municipal water demand, while the industrial and agricultural sectors are dependent on limited groundwater resources, the country’s only freshwater resource.

**“ Annual groundwater withdrawal rates are several times the natural recharge rate ”**

The overexploitation of groundwater aquifers is causing a decline in aquifer levels, leading to seawater intrusion and creating the conditions for high vulnerability to groundwater salinization.

- **Production of Brine**

The production and disposal of brine, a concentrated saline solution from desalination, pose significant environmental and economic challenges. It adversely affects marine life and requires costly disposal. As Qatar accounts for 5.8% of global brine production, improved management strategies are essential to mitigate environmental impacts and stimulate advancements in desalination facilities, safeguarding water supplies for future generations.





## Qatar's Efforts towards a More Secure Water Future

### • Mega Reservoirs Project

Kahramaa initiated the Mega Reservoirs Project in 2014 to address Qatar's growing water demand and limited freshwater resources. The project's goal is to ensure a seven-day potable water supply in compliance with Kahramaa and World Health Organization standards by expanding existing reservoirs and constructing new mega reservoirs.



Currently, Qatar only has a 48-hour water storage supply for emergencies. By 2026, the project aims to establish five mega-reservoir sites with a seven-day storage capacity, and future phases will further expand these sites to meet the 2036 water demand. The first phase involves building 24 concrete reservoirs and around 480 km of buried

ductile iron pipelines, while the second phase, planned after 2020, will add more pipelines and 16 new reservoirs to achieve a total storage capacity of about 16.7 MCM of water.

### • Desalination Plants

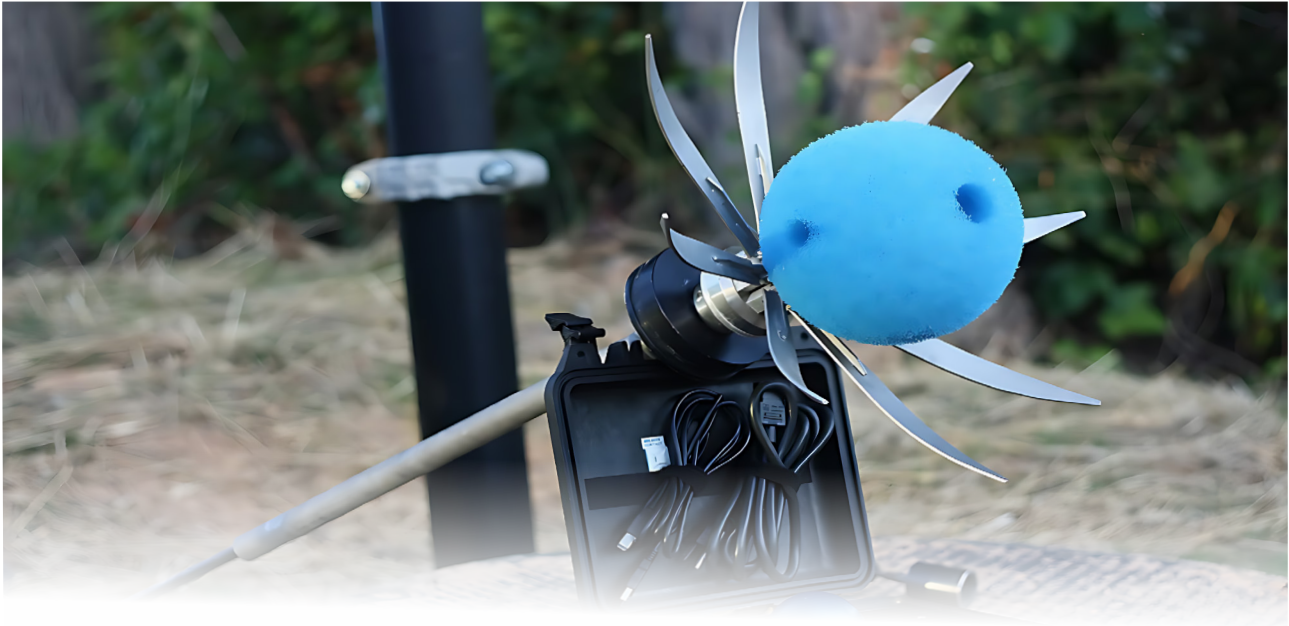
Desalination is the main source of domestic water supply in Qatar, meeting about 50% of the total water demand. The first seawater desalination plant was established in 1953, based on the submerged tube process, with a capacity of 682 m<sup>3</sup>/d. The second plant was set up in 1962 at Ras Abu Aboud, based on the commercially successful multi-stage flash distillation process, with a capacity of 0.25 MCM/d. Since then, Qatar has invested in building several desalination plants to meet its water needs. Kahramaa is responsible for the distribution of the desalinated water to domestic users.

### Issues with relying on a Desalination Water Supply

While Qatar relies on desalination to meet its water needs, there are some issues around their use. The plants are expensive, consume a lot of energy during operation, and arguably, are not very environmentally friendly. They're also vulnerable to natural crises and security conflicts. Another big problem was that a large amount of water was lost in the network due to leakage. The current capacity of Qatar's desalination plants is around 540 MCM/yr, but approximately 30% of this volume is lost through network leaks, while the remainder is used for domestic purposes. The capital city, Doha, has considerable volumes of water leaks from pipes and other sources, estimated at around 15 million m<sup>3</sup> /year.

### Crux of the Issue

Leakage, a significant component of distribution loss, lacks regulation in the Gulf states, where the focus is on enhancing water supply, desalination, and water treatment infrastructure. The leakage not only leads to the loss of purified drinking water but also wastes energy and material resources used in abstraction, transportation, and treatment. Water operators allocate about 22% of their profits to infrastructure renovations and new investments, costs ultimately borne by consumers. Revenue from Non-Revenue Water (NRW) leakage management solutions is expected to increase from \$850.5 million in 2018 to \$1594.3 million in 2025. A World Bank study estimates water utilities incur about \$141 billion annually due to NRW, with the majority in developed nations. Approximately 90 million cubic meters of water are lost daily to leaks, equivalent to around \$6 billion and the daily water consumption of 300 million people. In addition to the significant environmental and economic consequences, leaks can lead to accidents, breaks, power outages and, in the most serious circumstances, explosions and floods.



### Initiatives for Water Conservation and Leak Detection in Qatar

Regarding water distribution, Qatar has implemented several measures to decrease water losses by enhancing the transmission and distribution networks and improving metering and billing procedures using Advanced Metering Infrastructure (AMI) and Billing and Customer Relationship Management (BCRM), set to commence in 2020. This effort was initiated towards the end of 2019 with the aim of achieving a 10% reduction in water loss, currently at a 7% reduction. Additionally, the Project Monitoring System for Electricity and Water project was finalized in 2019, and the implementation of the BCR system automation for Electricity and Water project has reached 70% completion.

### Innovative Smart Technologies by Xylem

In the quest for efficiency, Qatar relies on the development of innovative smart technologies to enhance resource utilization and swiftly pinpoint vulnerabilities within the network. Effective leak management is a crucial component of this efficiency. Smart technology covers 100% of all networks to minimize leaks. Idrira Qatar (Aguas de Valencia International) implemented a water leak detection service in Qatar's distribution networks, utilizing state-of-the-art acoustic instrumentation (SmartBall) provided by Xylem. The Objective to Detect leak on large-diameter mains and 1220+km pipeline has been inspected. This represents a significant advancement and a promising opportunity for the future of electricity and particularly water utilities in Qatar, responsible for water collection and distribution from DWTP and desalination plants. This project has facilitated comprehensive pipeline inspections and the efficient detection of leaks, thereby reinforcing Qatar's water security efforts and presenting a significant opportunity for future enhancements in the management and conservation of water resources.

### Features of SmartBall Technology

SmartBall is an innovative technology that combines acoustic leak detection sensitivity with 100% coverage in line inspection. The spherical, free-swimming device can silently roll through pipelines, detecting small leaks with high responsiveness. It can be launched and retrieved using conventional pig traps, navigating obstacles that would otherwise render a pipeline unpiggable. Originally developed for the water industry, it has been refined for oil and gas pipelines over 4 inches in diameter, capable of detecting leaks in liquid lines of less than 0.1 gallons per minute, compared to 1% of throughput using conventional methods. Unlike traditional techniques, SmartBall uses a single acoustic sensor propelled by the pipeline's flow, recording all noise events to detect small leaks accurately. This allows the sensor to pass in close proximity to any leak, distinguishing its noise signature from background noise.

### • Smart Ball Technology : Driving Substantial Cost Savings and Long-Term Benefits in Leak Detection

The Smart Ball technology has proven to bring substantial cost savings by efficiently detecting leaks. In Dubai, its implementation led to the detection of 43 leaks, saving around 130 million imperial gallons of water and AED 5.2 million from April 2021 to the end of 2022. This demonstrates the potential financial benefits for Qatar, a region focusing on sustainable resource management, especially where water is scarce. The technology not only prevents water loss, resulting in direct savings, but also contributes to long-term financial benefits by preserving infrastructure. With its capability to detect small leaks and cost-effectiveness, it offers significant savings and reliability, potentially avoiding major pipeline failures and ensuring pipeline longevity for Qatar.



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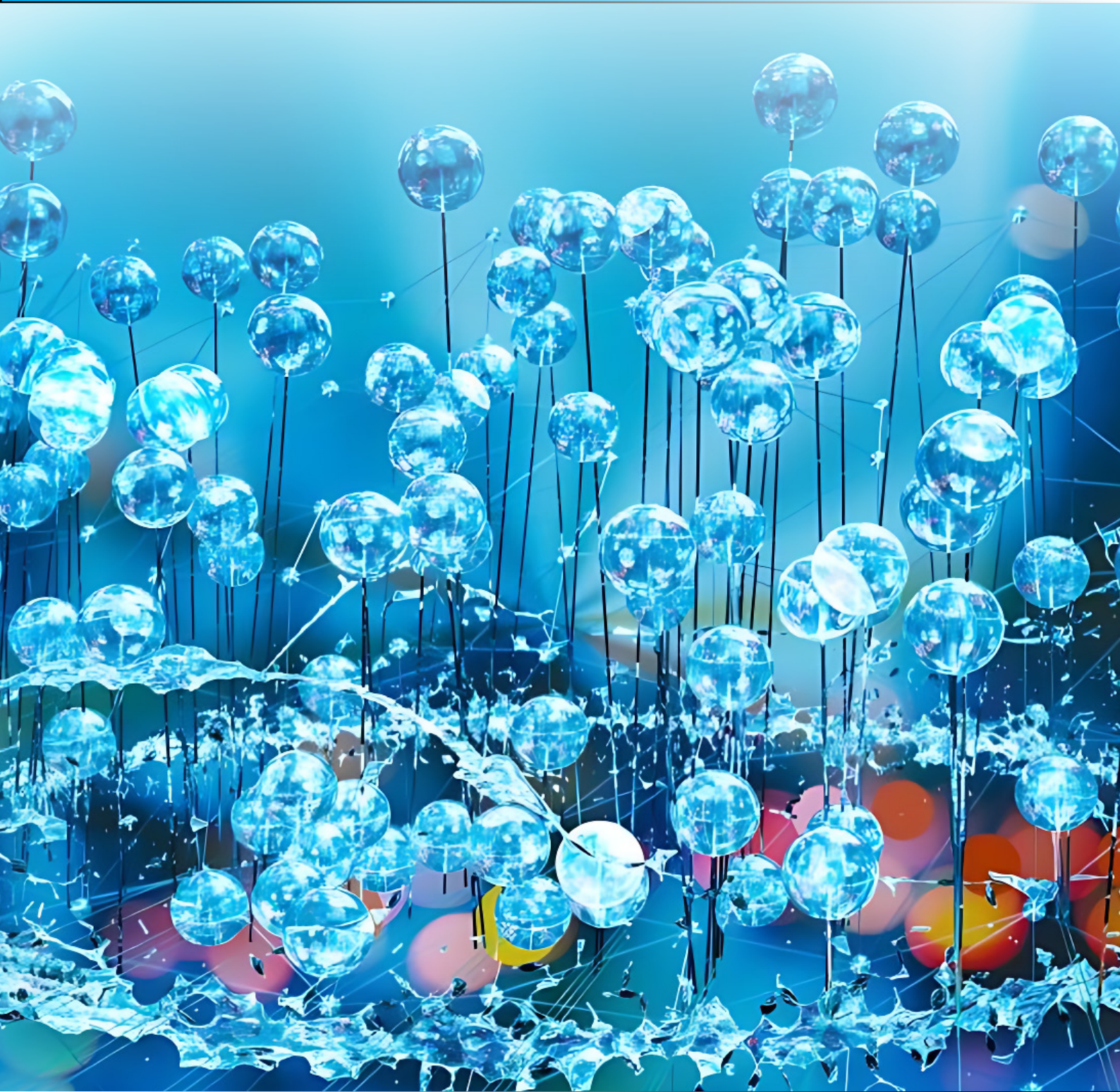
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# Changing the Landscape of Water Management with Jacob's Digital OneWater



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**D**igital OneWater, developed by Jacobs, represents a groundbreaking approach to water management, leveraging cutting-edge digital tools and domain expertise to revolutionize the industry. By harnessing advanced technologies such as data analytics, AI, digital twins, cloud computing, IoT, automation, and cybersecurity, Digital OneWater aims to optimize water assets, enhance operational efficiency, and promote sustainability across the entire water cycle. This article explores the transformative impact of Digital OneWater through real-world projects and collaborations, showcasing its potential to empower utilities as insights-driven organizations in efficiently managing water resources amidst a changing world.

### Introducing State-of-the-Art Technology to Water

Digital OneWater is an integrated ecosystem of data-enabled solutions developed by Jacobs, a global engineering and technology company. It takes a holistic approach to managing water resources by leveraging innovative digital tools and domain expertise. Here's how it harnesses new technology:

- **Data Analytics and AI**

Digital OneWater utilizes advanced data analytics and artificial intelligence (AI) to process vast amounts of data collected from various sources, such as sensors, meters, and IoT devices. This data is then analyzed to extract actionable insights, enabling more informed decision-making and optimized operations.

- **Digital Twins and Modeling**

By creating digital twins, which are virtual replicas of physical water systems, Digital OneWater can simulate and model different scenarios, test new technologies, and identify potential issues before implementing them in the real world. This approach helps to improve efficiency, reduce risks, and make more informed decisions.

- **Cloud Computing and IoT**

Digital OneWater leverages cloud computing and the Internet of Things (IoT) to collect, store, and process data from various sources in real-time. This allows for remote monitoring, predictive maintenance, and rapid response to potential issues, enhancing the overall management and resilience of water systems.

- **Automation and Smart Infrastructure**

Through the integration of advanced automation technologies and smart infrastructure, Digital OneWater can optimize processes, reduce manual intervention, and improve the overall efficiency of water operations. This includes smart metering, automated control systems, and intelligent asset management.

- **Cybersecurity and Data Management**

Recognizing the importance of data security and

privacy, Digital OneWater incorporates robust cybersecurity measures and data management practices. This ensures the protection of sensitive information and the integrity of the entire water management ecosystem.



### Making Waves – A Vision for Digital Water Utilities

Digital OneWater, Jacobs' innovative approach to water management, is poised to revolutionize the way water utilities operate. By harnessing the power of data-driven solutions and cutting-edge digital technologies, it aims to optimize water assets, enhance operational efficiency, and promote sustainability across the entire water cycle.

- **Improved Asset Management**

Through the integration of digital tools and data analytics, Digital OneWater enables water utilities to gain deep insights into their infrastructure and assets. This allows for proactive maintenance, timely repairs, and informed decision-making, ultimately extending the lifespan of critical water assets and reducing long-term costs.

- **Operational Optimization**

By leveraging advanced data analysis techniques, Digital OneWater helps utilities identify inefficiencies, reduce water losses, and optimize energy consumption. This not only enhances operational efficiency but also contributes to cost savings and environmental sustainability.

- **Sustainability and Resilience**

Digital OneWater's holistic approach, encompassing the entire water cycle, enables utilities to embrace circular economy principles, promote water reuse, and develop effective water management strategies. This supports water security, climate resilience, and the overall sustainability of water resources.

- **Enhanced Customer Experience**

With Digital OneWater, utilities can leverage data-driven insights to improve customer service, provide transparency, and address concerns more effectively. Real-time monitoring and predictive analytics can help utilities proactively address potential issues, enhancing customer satisfaction. Overall, Digital OneWater represents a paradigm shift in water management, empowering utilities to become data-driven, insights-driven organizations that can efficiently manage water resources while meeting the challenges of a changing world.

## Jacobs is Shaping the Future of Water in Singapore

- **Jacobs Innovates with Advanced Changi Water Reclamation Plant Model**

CWRP is one of the world's largest and most advanced water reclamation plants designed by Jacobs. Working closely with PUB and with support from National Research Foundation Singapore, Jacobs is designing the model with customized user interfaces to improve its functionality and maximize user experiences. Through a secured connection to the SCADA system, the model replicates CWRP's hydraulic, process, and control components with near-real-time data feeds.

***“ The data are checked to enhance accuracy before being automatically fed into Replica™ for hydraulics and control simulation and Sumo© for process simulation of the wastewater treatment plant”***

The model continuously adjusts its calibrations within defined ranges to match the plant's observed performance via machine learning, ensuring simulations are relevant to real operations without requiring intervention from staff. The model is also capable of creating customizable scenarios for operator training, thus facilitating knowledge transfer to new staff. The Replica™ whole plant simulation model technology is now being used by Jacobs on water applications globally.

- **Jacobs' Digital Innovation: Transforming Tuas WRP for Sustainability**

PUB is developing the Tuas Water Reclamation Plant (WRP) as part of the Deep Tunnel Sewerage System Phase 2 (DTSS2) project in Singapore, addressing long-

term water recycling needs. With phase two set for completion in 2026, the system will extend coverage to the western and southern regions, bolstering water reclamation and recycling capabilities. Upon completion, the Tuas WRP will be the world's largest membrane bioreactor facility, treating 800,000 cubic meters of used water daily. Jacobs is tasked with detailed design, construction supervision, and digital integration for the project.

***“ Jacobs leveraged ProjectWise and Bentley's applications to develop design models for Tuas WRP, utilizing LumenRT for presentations ”***

The Bentley iTwin Platform facilitated a digital delivery process, enabling collaborative review and real-time progress visualization, simplifying collaboration for non-technical users. This digital solution allowed model-based tendering and integration of multisourced 3D information, including photogrammetry, to create a dynamic digital twin, fostering information democratization across the project team. Over 200 personnel were empowered by user-friendly applications, enabling model-based tendering and reducing timelines by 50%, while saving 75% in model federation time. These initiatives, alongside value engineering, reduced forecasted capital expenditure by over 5%, marking a significant milestone in Jacobs' digital transformation journey.

## Sustainability Collaboration : United Utilities and Jacobs

United Utilities serves over 7.3 million customers in the geographically diverse north-west of England, managing 78,000 km of sewers and 3,000 pumping stations. The company faces challenges from a growing population, aging network, and climate change, and seeks to predict performance and proactively manage the sewer network to minimize the impact of failures on customers and the environment. United Utilities harnessed a Dynamic Network Management (DNM) approach that leverages a cutting-edge technology stack to solve these challenges before they became problems.



A key player in this stack is Aqua DNA, an intelligent digital solution that collects live data and improves wastewater network performance using smart sensors and AI powered predictive analytics. The system works in real-time and applies descriptive, diagnostic and predictive analytics to maintain system performance and, crucially, avoid household flooding, environmental spills, blockages and other pollution-causing events. Thanks to state-of-the-art sensors, cloud-based software, and Aqua DNA's predictive AI, United Utilities has proactively resolved over 1,600 operational issues in 2022, saving time and money, reducing pollution, and protecting employees. This has led to a 13% decrease in sewer blockage, 20% reduction in sewer flooding, a 37% decrease in customer complaints, and a 25% reduction in lift station call-outs.

### Empowering Water Staff with Intelligent O&M Tools

In manufacturing, mining, and water treatment, operations are often reactive, addressing issues after equipment malfunctions or underperforms. This reliance on lagging indicators emphasizes troubleshooting over proactive operations, highlighting the need for real-time visibility and leading performance indicators. Field operators struggle with noisy SCADA systems and information overload, relying on qualitative decision-making. Jacob collaborated with Palantir, utilizing their Foundry platform to organize and analyze data with machine learning algorithms. These algorithms can be used to more efficiently operate blowers to reduce energy usage, dose less chemicals while still meeting permit limits, and prioritize maintenance activities. Instead of letting the data drive the actions of the operators, they get a text alert with a recommendation. The operator still makes the decision about what action to take, applying their experience and knowledge to use the data as insights into the plant's operation. The Intelligent O&M solution has resulted in significant 20-30% energy and/or chemical savings at Jacobs' facilities, empowering operators with actionable insights.

### • Partnership Leverages Intelligent O&M and Aqua DNA for Net Zero US Wastewater System

The City of Wilmington chose Jacobs to oversee its wastewater treatment plant, combined sewer overflow facilities, and Renewable Energy Biosolids Facility. Located near Philadelphia, Wilmington serves over 400,000 residents and is Delaware's primary economic hub. The partnership between Jacobs and Wilmington aims to integrate new technologies, achieve net-zero energy status, and reduce greenhouse gas emissions in support of the Wilmington 2028 initiative. Jacobs introduced two Digital OneWater solutions to enhance plant operations and decrease waste and energy usage. Aqua DNA enhances Combined Sewer Overflow (CSO) monitoring, enabling improved modeling and predictive operations, while Intelligent O&M optimizes processes by improving the effluent chlorination algorithm, which provides automated notification to adjust chlorination set points for optimal dosing. This solution combines Jacobs' expertise with Palantir's platform to provide direct and predictive guidance to frontline Operations & Maintenance (O&M) staff, contributing to the initiative's goals.

### Conclusion

Digital OneWater, developed by Jacobs, revolutionizes water management by integrating data-enabled solutions and cutting-edge technologies. It utilizes data analytics, AI, digital twins, cloud computing, IoT, automation, and cybersecurity to optimize water assets, enhance operational efficiency, and promote sustainability. Jacobs' innovative projects in Singapore and collaborations with organizations like United Utilities and the City of Wilmington demonstrate the real-world impact of Digital OneWater, leading to improved asset management, operational optimization, sustainability, resilience, and enhanced customer experience. The approach empowers utilities to become insights-driven organizations, efficiently managing water resources in a changing world.





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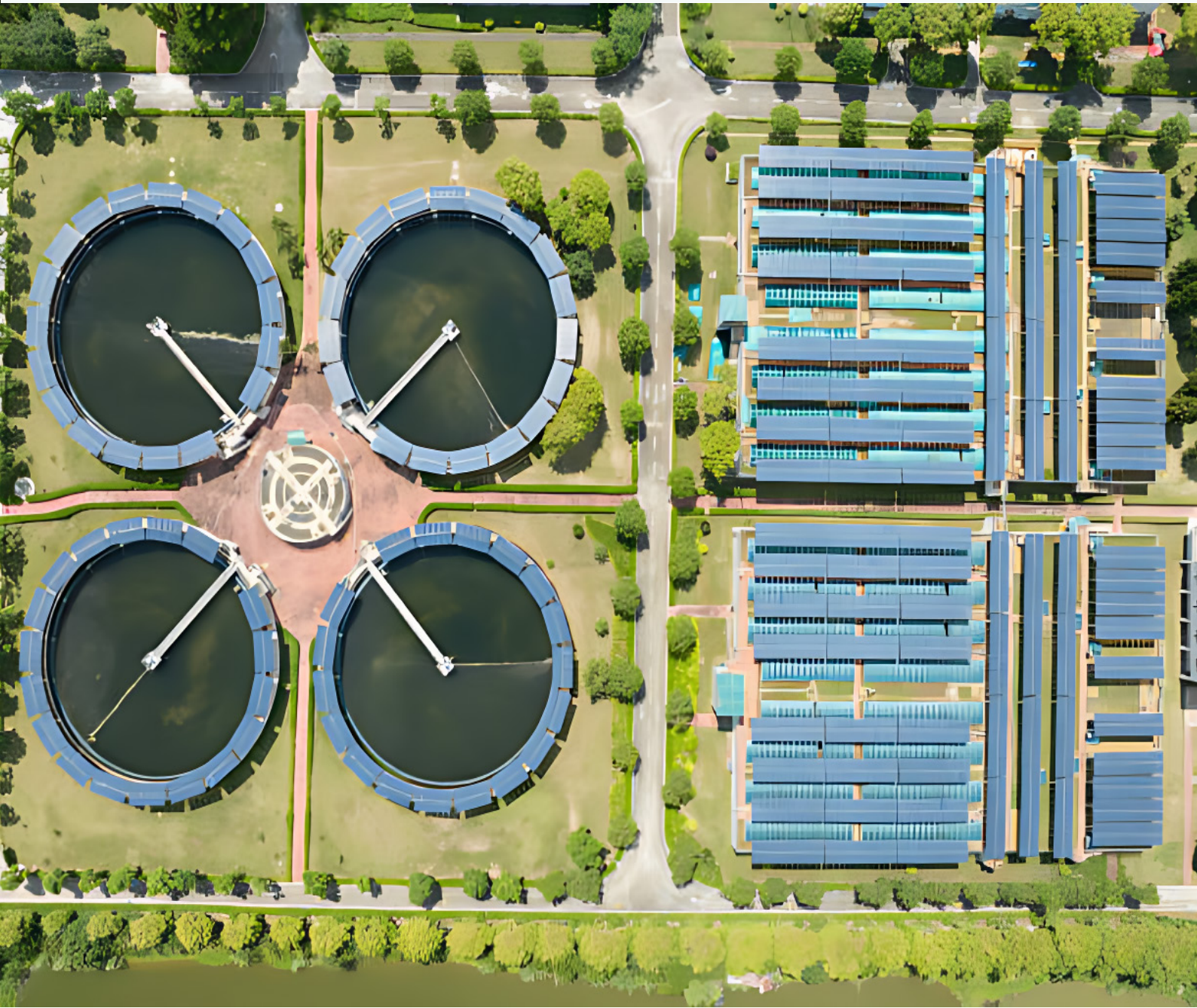
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# **Green Wastewater Infrastructure Reduces Emissions & Saves Costs**



**A shift towards "green" wastewater infrastructure offers the potential to significantly reduce emissions while providing substantial cost savings.**

**W**astewater infrastructure plays a critical role in managing water resources and reducing environmental impact. Traditional systems often rely on energy-intensive processes that contribute to greenhouse gas emissions. Green approaches, such as constructed wetlands and water reuse technologies, utilize natural processes and renewable energy sources to treat and recycle wastewater. By adopting these methods, municipalities can minimize energy demands, decrease chemical usage, and realize long-term financial benefits through reduced operating costs. The transition to green wastewater infrastructure presents an opportunity to develop more sustainable water management practices that benefit both the environment and the community's bottom line.

### How Green Wastewater Solutions Can Curb Carbon Footprints?

Traditional wastewater treatment systems are notoriously energy-intensive, consuming vast amounts of electricity and contributing significantly to greenhouse gas emissions. In fact, the wastewater sector is responsible for around 3% of global greenhouse gas emissions. However, by transitioning to green wastewater infrastructure, municipalities can dramatically reduce their carbon footprint. For example, a study conducted in the United States found that the adoption of constructed wetlands, biogas recovery, and other nature-based solutions can slash wastewater-related emissions by up to 65%.

***“ In Europe, a comprehensive analysis revealed that implementing green wastewater technologies could reduce emissions by 45 to 75 million tons of CO2 equivalent annually ”***

### Wastewater Reborn: Transforming Waste into Sustainable Savings

As the world faces growing environmental challenges, the concept of "Wastewater Reborn" has emerged as a promising solution.

By transforming waste into valuable resources, this innovative approach not only reduces the strain on our natural ecosystems but also offers tangible financial benefits.

Through advanced water treatment technologies, municipalities and industries can recycle and repurpose wastewater, generating substantial cost savings on water and energy consumption.

Moreover, the recovered resources, such as nutrients, can be sold or reused, creating new revenue streams and furthering the pursuit of sustainability.

With a focus on Wastewater Reborn, communities can drive towards a more circular economy,

where waste is viewed as a valuable commodity rather than a burden, unlocking a future of environmental preservation and economic resilience.

### How Green Infrastructure Can Curb Carbon Footprints

Green infrastructure, such as urban forests, rain gardens, and green roofs, has the potential to significantly reduce carbon footprints.

***“ Studies have shown that a 10% increase in urban tree canopy cover can lead to a 5-10% reduction in energy use for cooling buildings ”***

Additionally, green roofs can lower a building's energy consumption by up to 50% and reduce the urban heat island effect by up to 2°C. By implementing these green infrastructure solutions, cities can expect to see a 15-20% reduction in their overall carbon emissions. However, the initial investment required for these projects can be a barrier, costing anywhere from \$10 to \$30 per square foot. Despite the upfront costs, the long-term benefits of green infrastructure, including improved air quality, reduced stormwater runoff, and increased property values, make it a worthwhile investment for cities looking to combat climate change and create more sustainable communities.



## The Untapped Potential of Sustainable Wastewater Systems

Sustainable wastewater systems offer significant untapped potential for eco-friendly investments. Recent studies have shown that the global market for wastewater treatment and recycling technologies is expected to grow from \$221 billion in 2020 to \$344 billion by 2027, a compound annual growth rate of 6.5%. This growth is driven by increasing water scarcity, stricter environmental regulations, and a greater awareness of the environmental impact of traditional wastewater management.

**“ Implementing decentralized, nature-based wastewater treatment solutions, such as constructed wetlands and bioreactors, can reduce energy consumption by up to 30% and lower operational costs by 20-40% compared to conventional centralized treatment plants ”**

Additionally, the water recycled from these sustainable systems can be used for irrigation, industrial processes, or groundwater recharge, reducing freshwater withdrawal by 15-25%. The upfront investment for these eco-friendly wastewater systems can range from \$50,000 to \$500,000 per project, but the long-term savings and environmental benefits make them a worthwhile investment for municipalities, industries, and communities looking to reduce their water footprint and carbon emissions. petition for resources, potentially leading to environmental degradation, deforestation, and habitat destruction as companies and communities seek alternative sources.

## The Financial and Environmental Benefits of Green Wastewater Infrastructure

Green wastewater infrastructure holds significant potential to transform waste into wealth, both financially and environmentally.

**“ Studies have shown that the global market for green wastewater technologies is expected to grow from \$120 billion in 2021 to \$180 billion by 2027, a compound annual growth rate of 7% ”**

This growth is driven by increasing water scarcity, stricter environmental regulations, and a greater emphasis on sustainable resource management.

Implementing nature-based wastewater treatment solutions, such as constructed wetlands and algae-based bioreactors, can reduce energy consumption by up to 40% and lower operational costs by 30-50% compared to traditional centralized treatment plants. Additionally, these green systems can recover valuable resources like nutrients, biogas, and reclaimed water, generating additional revenue streams for municipalities and industries.

The upfront investment for green wastewater infrastructure typically ranges from \$75,000 to \$1 million per project, but the long-term financial savings, combined with the environmental benefits of reduced greenhouse gas emissions and improved water quality, make it a strategically sound investment for organizations seeking to transition from a linear to a circular economy.

## How Sustainable Wastewater Management Can Drive Down Costs and Emissions

Sustainable wastewater management practices can significantly drive down both costs and emissions for municipalities and industries. Studies have shown that implementing nature-based solutions, such as constructed wetlands and algae-based treatment systems, can reduce wastewater treatment operating costs by up to 35% compared to traditional centralized plants. These eco-friendly systems leverage natural processes to treat and recycle water, lowering energy consumption by 20-30%. Additionally, the biogas produced through anaerobic digestion of wastewater can be captured and used to generate renewable energy, offsetting up to 50% of a facility's electricity needs.

In terms of emissions, sustainable wastewater management can cut greenhouse gas outputs by 30-40% by reducing the use of carbon-intensive treatment methods and enabling the capture of methane. The upfront capital costs for transitioning to green wastewater infrastructure range from \$2 million to \$10 million per project, but the long-term savings on operational expenses and the environmental benefits of reduced carbon footprints make it a worthwhile investment. As water scarcity and climate change concerns intensify, sustainable wastewater solutions will play a crucial role in helping communities and industries achieve their sustainability goals.



## Revolutionizing Wastewater Infrastructure for a Cleaner, Greener Future

Revolutionizing wastewater infrastructure through green solutions can dramatically improve efficiency and environmental sustainability. Studies have shown that by transitioning to decentralized, nature-based treatment systems, municipalities can reduce their wastewater operational costs by 25-40%. These eco-friendly approaches, such as constructed wetlands and algae-based bioreactors, leverage natural processes to treat and recycle water, lowering energy consumption by 30-40% compared to traditional centralized plants. Additionally, the biogas generated through anaerobic digestion can be captured and used to generate up to 35% of a facility's electricity needs, further reducing reliance on grid-supplied power. In terms of environmental impact, green wastewater infrastructure can cut greenhouse gas emissions by 40-50% by minimizing the use of carbon-intensive treatment methods and enabling the recovery of valuable resources. The upfront capital costs for these revolutionary systems typically range from \$5 million to \$20 million per project, but the long-term cost savings and significant environmental benefits make it a worthwhile investment for municipalities and communities looking to build a cleaner, greener future.

## The Surprising Savings and Environmental Impact of Green Solutions

Green wastewater solutions are transforming the industry, offering surprising financial and environmental benefits. Recent studies have shown that implementing nature-based treatment systems, such as constructed wetlands and membrane bioreactors, can reduce operational costs by 20-40% compared to traditional centralized plants. These sustainable approaches leverage natural processes to treat and recycle water, lowering energy consumption by 25-35%. Additionally, the biogas produced through anaerobic digestion can be captured and used to generate up to 30% of a facility's electricity needs, further reducing reliance on grid-supplied power.

In terms of environmental impact, green wastewater solutions can cut greenhouse gas emissions by 35-45% by minimizing the use of carbon-intensive treatment methods and enabling the capture of methane. The upfront capital costs for transitioning to these eco-friendly systems typically range from \$3 million to \$15 million per project, but the long-term operational savings and reduced carbon footprint make it a worthwhile investment. As water scarcity and sustainability concerns continue to grow, wastewater transformed by green solutions will play a crucial role in helping municipalities and industries achieve their environmental goals while also realizing substantial financial benefits.



## Investing in Green Wastewater Systems for Long-Term Environmental and Financial Gains

Investing in green wastewater systems can be a lucrative and environmentally conscious decision for municipalities and businesses. Studies have shown that upgrading to energy-efficient, eco-friendly wastewater treatment can yield up to 30% savings on operating costs over a 10-year period. Additionally, these systems can reduce a facility's carbon footprint by as much as 15%, helping organizations meet sustainability goals and attract environmentally-conscious consumers.

Upfront costs can range from \$500,000 to \$2 million, depending on the size and scope of the project, but the long-term financial and environmental benefits often justify the initial investment. With a payback period of 5-7 years on average, green wastewater systems have become an increasingly attractive option for organizations looking to maximize their liquid assets while minimizing their environmental impact.

***“ Studies have shown that upgrading to energy-efficient, eco-friendly wastewater treatment can yield up to 30% savings on operating costs over a 10-year period ”***

## Conclusion

The switch to green wastewater infrastructure presents a compelling opportunity for municipalities and businesses to drive significant environmental and financial benefits. By investing in eco-friendly treatment systems, organizations can reduce their carbon footprint by up to 15% and unlock operating cost savings of 30% or more over the long term. While the upfront capital investment can be substantial, ranging from \$500,000 to \$2 million, the payback period of 5-7 years on average makes a strong business case for this type of sustainable infrastructure upgrade.

Beyond the direct financial returns, green wastewater systems also position organizations as environmental leaders in their communities, helping to attract eco-conscious consumers and meet evolving regulatory requirements. As the urgency to address climate change and resource scarcity continues to grow, the decision to transition to green wastewater solutions will become increasingly critical for organizations seeking to future-proof their operations and maximize the value of their liquid assets. With the right planning and implementation, this infrastructure shift can deliver a win-win outcome for the environment and the bottom line.





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# WATER NEWS BRIEF

———— MAY 2024 ————



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## ACWA Power signs an \$800 million Agreement to purchase Water with Senegal

ACWA Power has secured a SR3 billion (\$800 million) agreement with Senegal's Ministry of Water to build a cutting-edge desalination plant. The deal entrusts ACWA Power with the entire project, covering infrastructure development, design, financing, construction, operation, and maintenance of the Grande Cote seawater desalination plant in Senegal, West Africa. The plant is projected to produce 400,000 cubic meters of water per day. The first phase is expected to commence by the first quarter of 2028, with a contract duration of 32 years. This agreement strengthens the existing partnership between ACWA Power and Senegal, following a memorandum of understanding (MoU) signed in September 2022 for a seawater reverse osmosis plant with a 300,000 cubic meters per day capacity in Grande Cote.



## NX Filtration receives Order from Delco Water for First Nations Water Treatment Project in Canada



Delco Water has chosen NX Filtration to provide hollow fibre nanofiltration (NF) membranes for a new water treatment plant in Canada, marking the second project for which NX Filtration supplies its 'direct' NF (dNF) membranes through Delco Water. The initiative aims to enhance and expand the water treatment system for a remote community, delivering clean drinking water from lake water with high organics. With a capacity of approximately 1,000m<sup>3</sup>/day, the project is set to be operational by the end of 2024. It is part of a Canadian investment program for improving clean drinking water, wastewater, and stormwater infrastructure in First Nation communities. NX Filtration's dNF technology is highlighted for its ability to eliminate contaminants and offer cost-effectiveness and sustainability benefits.

## WEG to deliver 'Sustainability' Presentation at Europump's 2024 Annual Meeting

WEG, a global leader in motor, drive, and asset management systems technology, is set to headline the Europump annual meeting from 22-24 May 2024 in the UK as the headline sponsor. The company will deliver a keynote presentation on the ethical, ecological, and commercial benefits of sustainability, featuring senior executives Daniel Godinho and Martin Brand from WEG HQ in Brazil. The presentation will cover WEG's internal ESG programs, products, and solutions aimed at supporting partners' decarbonization journey and reducing energy consumption and CO<sub>2</sub> emissions. The meeting, hosted by the British Pump Manufacturers Association (BPMA), will offer valuable practical insights for Europe's pump manufacturers and suppliers, featuring a lineup of keynote speakers and sessions dedicated to Europump commissions.



## Saudis Scale Back Ambition for \$1.5 Trillion Desert Project Neom



Neom, a significant sustainable urban development in Saudi Arabia, is undergoing a notable shift in its trajectory, with ambitions tempered from 1.5 million residents to fewer than 300,000 by 2030. The Line, a city within Neom, faces setbacks, with only 2.4 kilometers of the envisioned 170-kilometer stretch expected for completion by the decade's end. This slowdown is evidenced by a contractor downsizing its workforce. Despite this, the \$1.5 trillion Neom endeavor remains focused on showcasing technological innovation and spurring economic growth. However, uncertainties linger as the kingdom's sovereign wealth fund hesitates to approve Neom's 2024 budget, reflecting the evolving fiscal landscape. Neom's aim to become a leading global producer of green hydrogen faces challenges amid the Public Investment Fund's financial considerations. Crown Prince Mohammed bin Salman outlined an initial phase of Neom with an estimated cost of 1.2 trillion riyals (\$320 billion) by 2030.

## ACCIONA and Jacobs Consortium to construct Alkimos Desalination Plant in Australia

Western Australia's Water Minister, Simone McGurk, revealed the selection of the Northern Water Partnership (NWP), comprising ACCIONA Agua Australia, ACCIONA Construction, and Jacobs Group Australia, to lead Stage 1 of the \$2.8 billion Alkimos Seawater Desalination Plant. The plant is set to provide 50 billion liters of drinking water annually upon its 2028 commissioning, with plans to double capacity to 100 billion liters in the future. Located in Alkimos, the facility aims to address Perth's water needs amid declining rainfall and groundwater resources. The consortium will also operate the plant under an alliance model with Water Corporation for at least 10 years from 2028. The project prioritizes environmental sustainability, with net-zero greenhouse gas emissions and a reduction of groundwater abstraction by 30 billion liters annually.



## SEWA implements Satellite Leak Detection Technology in UAE



Sharjah Electricity, Water and Gas Authority (SEWA) in the Emirate of Sharjah has utilized satellite technology to detect water leaks across its extensive 5,000 km network. Engineer Faisal Al Sarkal, Director of the Water Department, oversaw the deployment of this advanced technology, conducting a thorough examination of transmission and distribution lines. The project involved surveying 400 km of the network to precisely identify elusive leaks and their locations. In 2023, the team successfully detected and repaired 542 leaks, conserving 788 million gallons of water and saving approximately US\$7.3 million. Al Sarkal emphasized SEWA's commitment to monitoring and maintaining water networks to reduce losses in accordance with international standards. This initiative reflects SEWA's dedication to water conservation and efficient network management.



## Veolia Advances PFAS Mitigation in Drinking Water With More Than 30 Treatment Projects Launched in the U.S

Veolia, the largest private water services operator in the US, has achieved a significant milestone in treating PFAS chemicals, with over 30 sites reporting undetectable levels. They have installed new treatment at 17 wells in New York and are addressing PFAS contamination in drinking water across the country. Veolia's expertise and experience have allowed them to treat over 2.1 billion gallons of water, reducing PFAS levels below regulatory thresholds. They have conducted nearly 10,000 water sample analyses in the past five years to determine the best treatment options. Veolia is committed to leveraging its expertise to fight PFAS pollution globally and is leading the way in advancing PFAS treatment to improve public health. Veolia has demonstrated its unique ability to handle the complex task of dealing with PFAS in drinking water through its proactive efforts in New York, New Jersey, and Pennsylvania.



## Amid Company restructuring, NTT Data Chairman Eduardo Serra resigns from Position



NTT Data's longstanding Chairman of the Board, Eduardo Serra, has announced his departure after nearly two decades, marking a strategic transformation effort within the company. NTT Ltd. and NTT DATA's businesses outside Japan are set to merge, creating a technology services company with 140,000 employees globally and business in over 80 countries. Serra will continue as an external advisor, and his departure coincides with the resignation of other Spanish independent directors. These changes are part of a broader corporate restructuring initiative, with the possibility of appointing new independent directors in the future. The Board will temporarily consist solely of company executives, reflecting NTT Data's significant presence in Spain, where it employs over 20,000 professionals.

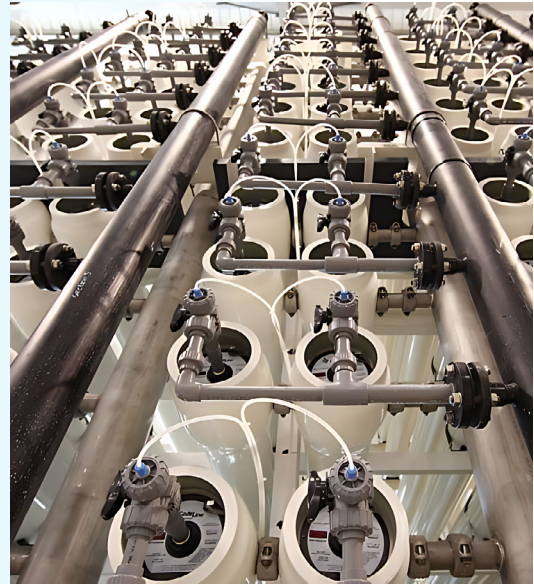
## Thames Water Investors pull plug on £500m of Funding amid standoff with Regulator

Thames Water has faced a setback as investors retract £500 million in emergency funding amid a regulatory standoff with Ofwat over proposed bill hikes, potentially increasing the likelihood of nationalization. Shareholders declined to release the initial £750 million tranche aimed at securing short-term cashflow due to unmet conditions. Thames Water aims to secure a PR24 regulatory determination that is affordable, deliverable, and financeable, with discussions ongoing. Despite this, the company maintains £2.4 billion in liquidity. CEO Chris Weston reassured customers of uninterrupted service. Ofwat emphasized safeguards for customer service and the need for improved company performance, highlighting Thames Water's substantial regulatory capital value, liquidity, and annual regulated revenue. The crisis unfolds amid a surge in sewage spills, with a 54% increase in 2023 compared to 2022, as reported by The Environment Agency.



## SWPC receives Bids for the Ras Mohaisen IWP

Saudi Water Partnership Company (SWPC) has received bids for the Ras Mohaisen Independent Water Plant (IWP), located 300 kilometers south of Makkah. The facility is expected to produce 300,000 cubic meters of drinkable water daily, with storage tanks capable of holding 600,000 cubic meters and an electrical power substation. Bids have been submitted by ACCIONA and a consortium comprising ACWA Power, Haji Abdullah Alireza & Partners Company, and AlKifah Holding. The developer's responsibilities encompass the project's entire lifecycle, and commercial operations are anticipated to commence in the second quarter of 2028 under a 25-year Water Purchase Agreement (WPA). The Saudi Arabian government will provide a credit support agreement to reinforce SWPC's commitments, with KPMG Al Fozan & Partners leading as the financial adviser, supported by Eversheds Sutherland (International) LLP and WSP for legal and technical advisory services, respectively.



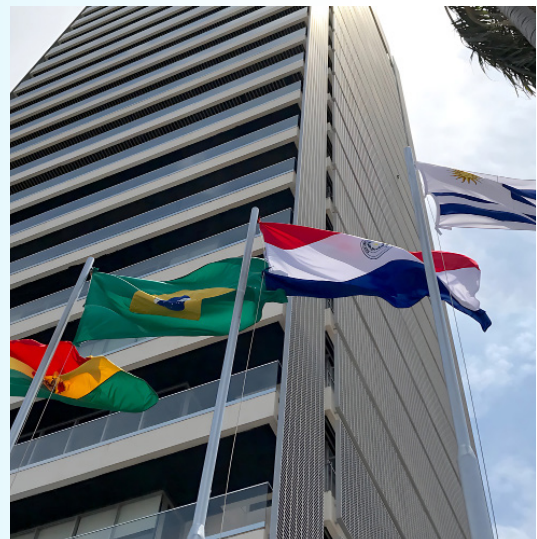
## Aganova is delighted to announce the Appointment of Alia López as the Regional Manager for the Middle East



Aganova, a leading technology company in pipeline inspection to prevent water loss, is pleased to appoint Alia López as the Regional Manager for the Middle East. With over two decades of experience in the water sector in the Middle East and Europe, Alia brings valuable technical and business development skills, along with a deep understanding of Aganova technologies. She sees significant growth opportunities in the leak detection sector in the Middle East, driven by the growing focus on water conservation and infrastructure development. Her appointment and the recent opening of the Dubai office underscore Aganova's commitment to growth and excellence in the leak detection market in the Middle East.

## FONPLATA greenlights a \$325 million Loan for Sanitation Projects in Uruguay

The loan agreement of USD 325 million for the "Universal Sanitation in Uruguay" project was signed in Montevideo, with the presence of the Ministry of Economy and Finance, the President of OSE, and FONPLATA's Executive President. The project aims to expand the sewage system in the country's interior, increasing coverage from 48% to 68% across 61 localities in 18 departments. The investment includes installing 812 kilometers of sanitation network, constructing 43 new wastewater treatment plants, refurbishing 3 existing plants, and connecting over 57,000 homes. This expansion will directly benefit 150,000 people and indirectly benefit over half a million individuals. The President of OSE highlighted the loan's significance in achieving the administration's objective of increasing sanitary sewage system coverage. FONPLATA's Executive President emphasized the project's importance in improving living conditions and contributing to member countries' development.



## Mobile Technology helps US Water Utilities achieve Compliance with new PFAS Rules

The EPA has introduced new regulations placing enforceable limits on PFAS in drinking water, impacting 4,100 to 6,700 public water systems serving up to 105 million people. This presents significant challenges for water utilities, requiring them to reduce PFAS levels and meet new public disclosure requirements. Xylem's innovative MitiGATOR™ Mobile System offers a solution, using granular activated carbon or ion exchange resins to mitigate contaminants. With remote monitoring and a flow rate of up to 1,000 gallons per minute, the system aids utilities in complying with the regulations. Xylem's Senior Vice President, Snehal Desai, emphasizes the system's ability to help utilities swiftly meet the new standards, offering a vital tool for addressing PFAS contamination in various settings.



## Connexin and NYnet Partner to Expand IoT Network, supporting Yorkshire Water Smart Meter Rollout



Connexin and NYnet have entered into a LoRaWAN® network sharing and operations agreement to rapidly expand the IoT network infrastructure in North Yorkshire. This collaboration will enable both organizations to enhance the network's reach and benefits for residents and communities. NYnet's existing LoRaWAN network covers 85% of North Yorkshire's geographical area, and the partnership will add 57 gateways to further expand the connectivity. This expansion will support the implementation of a new smart network as part of Yorkshire Water's advanced meter infrastructure (AMI) roll-out. The collaboration also allows NYnet to utilize the network for various council operations, such as social care, parking, public health, and initiatives like air quality monitoring in schools. The partnership includes a revenue share model agreement, facilitating open roaming onto each other's network service at no cost.

## Marc Lutikhuis steps down as CFO at NX Filtration

NX Filtration, a global provider of direct nanofiltration technology, has announced the resignation of its Chief Financial Officer, Marc Lutikhuis, effective June 30, 2024. Lutikhuis has played a key role in enhancing and professionalizing the company's finance function and has contributed significantly to its growth. Both Lutikhuis and the Supervisory Board have mutually agreed that he will pursue his career outside the company. Carolina Wielinga, Chair of NX Filtration's Supervisory Board, expressed gratitude for Lutikhuis' contributions and looks forward to announcing his successor to lead the company's future growth journey.





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# Webinars

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**Dr. Mohamed Mohsen**



**Eng. Mohamed Abdelaal**



**Dr. Ahmed Hasham**



**Dr. Mohamed Abdelfattah  
Hassan**



**Dr. Mahmoud Fathy  
Mubarak**



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**ENVIRONMENTAL RISK MANAGEMENT  
(HAZARDOUS AND NON  
HAZARDOUS WASTE)**



**Eng. Shereen Eltahawy**



**Date: Friday, May 3rd**



**Time: from 8 to 10 PM  
(Saudi Arabia Time)**

**Participants will get a certificate of attendance**

- Hazardous Waste Characteristics
- Hazardous Waste Generation
- How to Comply with Regulations
- Non-Hazardous Waste Generation

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**“HARNESSING ENERGY EFFICIENCY  
FOR SUSTAINABILITY ”**



**Dr. Mohamed Tash**



**Date: Saturday, May 4th**



**Time: from 7 to 9 pm  
(Saudi Arabia Time)**

**Participants will get a certificate of attendance**

- Understand the Concept of Energy Efficiency.
- Connect Energy Efficiency with Sustainability Goals.
- Identify Strategies for Implementing Energy Efficient Solutions
- Explore Policy and Regulatory Frameworks.
- Discuss Case Studies.

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# “HACCP SYSTEM IN BOTTLED WATER FACTORIES”



**Dr. Mohamed Mohsen**



**Date: Friday, May 10th**



**Time: from 7 to 9 pm  
(Saudi Arabia Time)**

**Participants will get a certificate of attendance**

- What is HACCP System
- HACCP System Importance
- How to Perform HACCP System
- 7 Principle of HACCP and Applied in Water Factories

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# “RO MEMBRANE TROUBLESHOOTING”



**Dr. Mahmoud Fathy Mubarak**



**Date: Saturday, May 11th**



**Time: 10 to 12 PM  
(Saudi Arabia Time)**

**Participants will get a certificate of attendance**

## **Part 1:**

- Introduction to the Energy Providers Used in Desalination Plants.
- Detailed Explanation of the PX Operation Method.
- Identifying PX Problems.
- Operating PX Correctly.
- Choosing the Appropriate PX Model for Your Plant.
- Calculations of Efficiency, Quantitative Blending Ratio, and Salinity in PX.
- Calculations of Efficiency, Quantitative Blending Ratio, and Salinity in PX.

## **Part 2 (Continuation of the Previous lecture):**

- Normalization Calculations and Practical Example.
- LSI Coefficient Calculations and S&DSI Coefficient Calculations.

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**“WATER DISINFECTION  
OPERATIONS”**



**Dr. Ahmed Hasham**



**Date: Friday, May 17th**



**Time: from 9 to 11 pm  
(Saudi Arabia Time)**

**Participants will get a certificate of attendance**

- Importance of Disinfection
- Properties of Chlorine
- Chemistry of Chlorination
- Chlorination Process
- Alternatives to Chlorination
- Impact of Chlorination
- Safety Considerations
- Chlorination Equipment

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**“ION EXCHANGE RESIN”**

**Dr. Mohamed Abdelfattah**



**Date: Saturday, May 18th**



**Time: from 10 to 12 pm  
(Saudi Arabia Time)**

**Participants will get a certificate of attendance**

- **What Is Ion Exchange Resin, Types and How Does It Work?**
- **How to Buy, Store, Maintain, and Dispose of Ion Exchange Resins?**
- **Ion Exchange Resin Regeneration**
- **Tests and Evaluation of Ion Exchange Resins**
- **Problems with Ion Exchange Resins and How to Avoid or Solve Them**

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## Free Online Webinar

**“NOVEL NANOMATERIALS AND GREEN CHEMISTRY SOLUTIONS FOR WATER PURIFICATION, DESALINATION ,AND WASTEWATER TREATMENT ”**



**Dr. Mahmoud Fathy Mubarak**



**Date: Friday, May 24th**



**Time: from 8 to 10 pm  
(Saudi Arabia Time)**

**Participants will get a certificate of attendance**

- Nanomaterials - Highlighting the Development of Novel Nanocomposites and Nanomaterials for Environmental Applications.**
- Green Chemistry Solutions - Pointing to the Sustainable and Eco-friendly Nature of Many of the Technologies and Processes.**
- Applications - Centering on Water: Purification, Desalination, Wastewater Treatment, Reuse, Produced Water Management, etc.**

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**“SUSTAINABLE DEVELOPMENT  
AND EGYPT'S VISION 2030”**



**Dr. Mohamed Elsofy**



**Date: Saturday, May 25th**



**Time: from 10 to 12 pm  
(Saudi Arabia Time)**

**Participants will get a certificate of attendance**

- **The Concept of Sustainable Development.**
- **Dimensions and Components of Sustainable Development.**
- **Components and Patterns of Sustainability.**
- **Characteristics of Sustainable Development.**
- **Agreements, Treaties, and International Entities Concerned with Climate Change.**
- **Sustainable Development Agenda "Egypt's Vision 2030".**
- **Updating the Sustainable Development Agenda "Egypt's Vision 2030".**
- **Egyptian Efforts t...**

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**INSTRUMENTAL ANALYSIS**



**Dr. Abu Alhassan Abd Elshafi**



**Date: Friday, May 31st**



**Time: from 9 to 11 pm  
(Saudi Arabia Time)**

**Participants will get a certificate of attendance**

■ **Basic Concepts for Measurement and Instrumentation**

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# Global Water Events

## Water & Wastewater Equipment, Treatment & Transport Show

Date: From 24 to 26 Jan 2024

Location: Indianapolis, Indiana

The Water & Wastewater Equipment, Treatment & Transport Show (WETT) was a showcase of the latest innovations within the wastewater industry. The show brings together industry experts, technologies and services. It provides 90+ expert-led courses, live show demonstrations, hundreds of interactive booths and networking opportunities.

Website: [wwettshow.com](http://wwettshow.com)



## BRITISH WATER Micropollutants Conference

Date: From 8 February 2024

Location: Leeds, UK

British Water continued the conversation on how micropollutants affect the water sector in the third BW Micropollutants Conference. Our speakers covered the latest topics on current legislation and ongoing initiatives about the environmental risks associated with micropollutant emissions and treatment approaches.

Website: [www.britishwater.co.uk](http://www.britishwater.co.uk)

## AOAP Conference and Exposition & NDPA Water Safety

Date: From 12 to 14 Feb 2024

Location: The Grand Sierra Resort and Convention Center in Reno, Nevada

The AOAP Conference and Exposition & NDPA Water Safety Conference was an opportunity for professionals from around the world to learn about the latest trends, legislation, and issues facing our industry. Education, networking & professional development opportunities during the conference are one of a kind.

Website: [ndpa.org](http://ndpa.org)

## WEF/AWWA Utility Management Conference 2024

Date: From 13 to 16 February 2024

Location: Portland, Oregon

The 2024 WEF/AWWA Utility Management Conference offered 6 pre-conference workshops and 36 technical sessions focused on a wide variety of topics related to water and wastewater utility management.

Website: [www.wef.org](http://www.wef.org)



## WEX Global

Date: From 4 to 6 March 2024

Location: Madrid, Spain

WEX Global was a three-day event which brings together the sector's leading experts to discuss water sustainability.

Website: [wex-global.com](http://wex-global.com)



## Membrane Technology Conference

Date: From 4 to 7 March, 2024

Location: West Palm BEach, Florida

The AMTA/AWWA Membrane Technology Conference explored the latest developments in membrane technology, as it affects water and wastewater treatment. The conference reveals new directions in water and wastewater treatment technologies, desalting and membrane bioreactor applications.

Website: [www.awwa.org](http://www.awwa.org)



## The Collection Systems Conference and Stormwater Conference 2024

Date: From 9 to 12 April, 2024

Location: The conference will be hosted at the Connecticut Convention Center in Hartford, CT.

The Collection Systems Conference and Stormwater Conference 2024 was an exhibition focused on the design and operations of wastewater collection systems, as well as wet weather control and stormwater management.

Website: [www.wef.org](http://www.wef.org)



## Texas Water Conference

Date: From 9 to 12 April, 2024

Location: NEC, Birmingham, B40 1NT, UK

The conference was celebrating its 28th year as the Largest Regional Water Conference in the U.S. © Itcaters to professionals in the wastewater and water industry, including water quality engineers, treatment plant technicians and scientists. Also government officials, regulatory agency personnel, manufacturers and their agents, libraries, universities and groups and individuals concerned with protecting public health and the environment.

Website: [www.txwater.org](http://www.txwater.org)

## MACH Exhibition

Date: From 15 to 19 April, 2024

Location: NEC, Birmingham, B40 1NT, UK

MACH 2024 was a five-day event where key manufacturing buyers, engineers and manufacturers go to find, specify and purchase new equipment.

Website: [www.machexhibition.com](http://www.machexhibition.com)



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# Renewably Producing Fresh Water with Renewable Desalination

Renewable desalination presents a promising and sustainable solution for fresh water production in the face of increasing water scarcity



The availability of fresh water is crucial in arid areas, despite it being scarce. Only 3% of the earth's water is fresh, with most of it frozen in glaciers and underground aquifers. Lakes and rivers hold just over 0.25% of the world's fresh water. The article focuses on using renewable energy for water desalination, especially in the Middle East and Northern Africa (MENA), where desalination is vital for water supply. Global water withdrawals reach 4,000 billion m<sup>3</sup> yearly, and desalination accounts for 0.6% of the global water supply, with the MENA region contributing 38% of the capacity, led by Saudi Arabia.

mal desalination, offer promising solutions for sustainable freshwater production. Solar desalination harnesses the power of the sun to evaporate and condense water, providing a clean and renewable source of energy. Wind-powered desalination utilizes wind turbines to generate electricity for the desalination process, reducing reliance on non-renewable energy sources.

Geothermal desalination leverages the heat from the Earth's core to power the desalination process, offering a reliable and sustainable energy source. These innovative technologies have



### Traditional desalination methods and their environmental impact

Traditional desalination methods, such as thermal distillation and reverse osmosis, are energy-intensive processes that require large amounts of electricity or fossil fuels to operate. The high energy consumption of these methods contributes to increased carbon emissions and air pollution, exacerbating the effects of climate change. Additionally, the intake of seawater and the discharge of concentrated brine back into the ocean can disrupt marine ecosystems, affecting marine life and coastal habitats. The use of chemicals for pre-treatment and cleaning in traditional desalination plants can lead to pollution of water sources and pose risks to human health and the environment.

### Renewable Desalination Technologies

Renewable desalination technologies, such as solar desalination, wind-powered desalination, and geother-

mal desalination, offer promising solutions for sustainable freshwater production. By utilizing renewable energy sources such as solar or wind power, desalination processes can significantly reduce their environmental impact and carbon footprint. This approach also helps to mitigate the energy intensity traditionally associated with desalination, making it more cost-effective and environmentally friendly. Furthermore, renewable desalination can provide a reliable source of fresh water in regions where traditional water sources are scarce, contributing to greater water security and resilience in the face of climate change and population growth.

### The benefits of renewable desalination

Renewable desalination offers several benefits for sustainable water production. By utilizing renewable energy sources such as solar or wind power, desalination processes can significantly reduce their environmental impact and carbon footprint. This approach also helps to mitigate the energy intensity traditionally associated with desalination, making it more cost-effective and environmentally friendly. Furthermore, renewable desalination can provide a reliable source of fresh water in regions where traditional water sources are scarce, contributing to greater water security and resilience in the face of climate change and population growth.

## Case studies of successful renewable desalination projects around the world

Renewable desalination has been successfully implemented in various projects around the world, showcasing its potential to address water scarcity sustainably. For instance, the pilot project in Perth, Australia, integrated solar power with desalination technology, demonstrating the feasibility of using renewable energy for large-scale water production. Additionally, the Al Khafji solar-powered desalination plant in Saudi Arabia has proven the effectiveness of combining renewable energy sources with advanced desalination methods to meet the water demands of arid regions. These case studies highlight the practicality and success of renewable desalination initiatives, offering valuable insights for addressing global water challenges in an environmentally conscious manner.

### The Al Khafji solar-powered desalination plant in Saudi Arabia

The Al Khafji solar-powered desalination plant in Saudi Arabia represents a significant leap in water innovation and sustainability. Inaugurated in 2018 under the guidance of His Royal Highness Prince Mohammed bin Salman bin Abdulaziz, this groundbreaking initiative goes beyond conventional desalination, symbolizing a paradigm shift towards a more promising future. With a daily output of 90,000 m<sup>3</sup>, the plant harnesses solar energy to transform seawater into pure, life-nurturing water, positioning Saudi Arabia as a leader in solar-driven desalination.

***“ The project's impact is evident in its achievements, including over 7 million cubic meters of desalinated water generated, a 40% reduction in cost per cubic meter, and a significant decrease in CO<sup>2</sup> emissions and crude oil consumption ”***

### Challenges and limitations of renewable desalination technologies

Renewable desalination technologies face several challenges and limitations that hinder their widespread

implementation. One of the primary challenges is the high initial investment required for setting up renewable desalination plants, which can be a barrier for many regions, especially those with limited financial resources.

Additionally, the intermittent nature of renewable energy sources such as solar and wind power poses a challenge to the consistent operation of desalination plants, as energy availability may fluctuate.

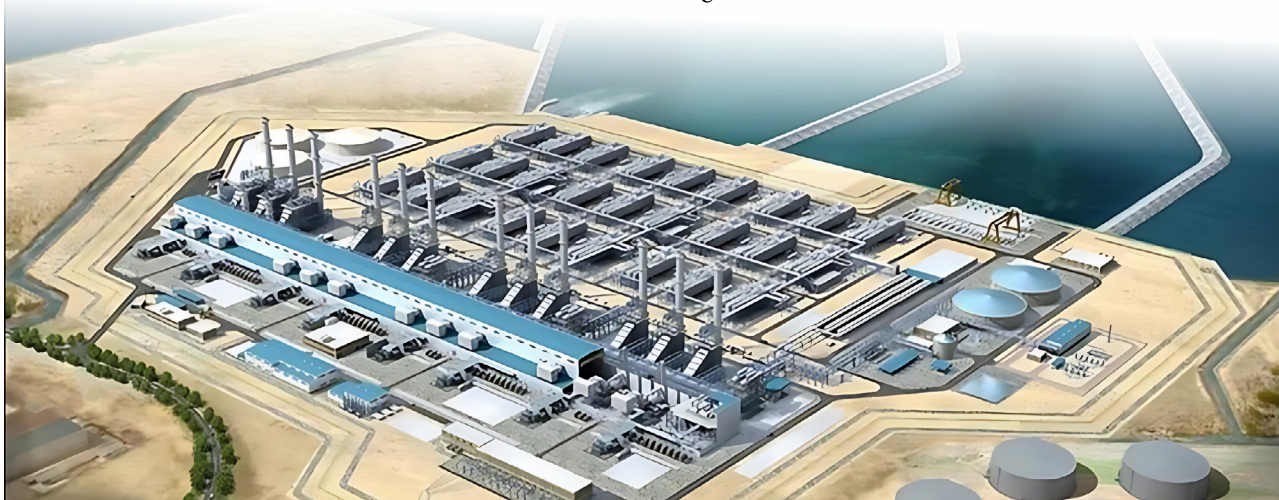
Furthermore, the efficiency of renewable desalination technologies, particularly in comparison to traditional fossil fuel-powered methods, is an area of ongoing development and improvement. Another limitation is the environmental impact of large-scale deployment of renewable desalination technologies, which may still have implications for marine ecosystems and land use. Addressing these challenges and limitations is crucial for the wider adoption of renewable desalination as a sustainable solution for water production.

### The potential for large-scale implementation of renewable desalination to address water scarcity

The potential for large-scale implementation of renewable desalination to address water scarcity is a promising solution. According to recent statistics, over 2 billion people worldwide are currently experiencing high water stress, and this number is projected to increase due to population growth and climate change. Renewable desalination offers a sustainable approach to providing clean water, with the potential to significantly reduce this alarming statistic. By utilizing renewable energy sources, such as solar and wind power, desalination plants can produce fresh water from seawater or brackish water, offering a viable solution to water scarcity in many regions.

### Conclusion

By harnessing renewable energy sources and advancing desalination technologies, we have the potential to provide clean water to communities around the world while minimizing environmental impact. As research and innovation in this field continue to progress, it is clear that renewable desalination holds the key to a more water-secure future. Embracing this sustainable approach to water production will not only address immediate water supply challenges but also contribute to long-term environmental conservation.





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# From Waste to Watts: Sustainable Solutions for a Greener Future

In the quest for sustainable energy solutions, an unlikely hero emerges from the depths of our urban infrastructure: wastewater. This untapped resource, often overlooked and undervalued, holds immense potential for energy recovery. "Unlocking Potential: Harnessing Energy from Wastewater" delves into the innovative technologies and strategies that transform waste into watts, offering a glimpse into a future where every drop counts in powering our world.

## The potential of wastewater as a renewable energy source

The potential of wastewater as a renewable energy source is vast and multifaceted. Wastewater, often perceived as a disposal challenge, is rich in organic matter that can be harnessed for energy production. When treated through sludge-to-energy systems, wastewater undergoes a transformation where the organic waste decomposes in an oxygen-free environment, releasing methane gas, a valuable source of energy.

This biogas can be utilized to generate electricity, heat homes, or even power vehicles, turning a waste product into a renewable energy resource. Moreover, the process of converting wastewater into energy addresses several critical issues, such as the growing demand for energy and the need for sustainable waste management solutions. It also contributes to energy self-sufficiency for wastewater treatment facilities, allowing them to operate independently of external power sources.

The integration of such systems not only provides a renewable energy solution but also aligns with the principles of a circular economy, where waste is repurposed to create value.

## Wastewater Energy Generation Techniques

**Microbial Fuel Cells (MFCs):** These innovative devices use microorganisms to convert organic biodegradable compounds in wastewater into electricity. MFCs perform bioelectrochemical processes, oxidizing organic matter to generate power. They have applications not only in wastewater treatment but also in contaminant removal, heavy metal removal, and biohydrogen production.

**Hydropower from Wastewater Systems:** By harnessing the flow of wastewater, hydropower technology can generate electricity. This approach is particularly relevant for existing urban water systems, where excess energy can be captured and utilized.

**Anaerobic Digestion:** In anaerobic digesters, microorganisms break down organic matter in wastewater, producing biogas (mainly methane). This biogas can be used for electricity generation or as a fuel source.

**Thermochemical Conversion Technologies:** These methods transform wastewater sludge into energy through processes like gasification, pyrolysis, and incineration. They help reduce waste volumes and contribute to circular economy principles. The captured energy can then be used to power wastewater treatment facilities or be fed back into the local energy grid.

## Environmental Benefits Wastewater Energy Generation

**Reduced Pollution:** Energy recovery techniques decrease the environmental impact of wastewater treatment. By converting organic matter into energy, they reduce the need for landfills and incineration, minimizing pollution and greenhouse gas emissions.

**Resource Recovery:** Recovering energy from wastewater helps offset the electricity consumption of treatment plants. It also contributes to sustainable resource management by utilizing waste streams effectively.

**Improved Water Quality:** Properly managed wastewater treatment plants play a crucial role in maintaining water quality. By removing pollutants, they ensure that treated water released back into the environment is safe.

**Mitigating Carbon Footprint:** Energy recovery reduces the reliance on fossil fuels. For example, anaerobic digestion and biosolids incineration can save significant amounts of electricity, contributing to a more sustainable energy mix.

**“ wastewater energy generation techniques not only enhance treatment processes but also promote environmental conservation and sustainable resource utilization ”**

By adopting these methods, we can mitigate pollution, reduce waste, and contribute to a cleaner, more energy-efficient future.



## wastewater treatment plants that have successfully integrated energy recovery systems

**Emasagra S.A., Granada, Spain:** This plant has been recognized for its waste-to-energy (WtE) technologies, focusing on sludge treatment and exploring emerging technologies like microalgae and membrane technologies.

**Hyperion Water Reclamation Plant, Los Angeles, USA:** Known for harnessing ‘blue energy’ from the mixing of seawater and treated effluent, this plant represents a coastal wastewater treatment operation that could potentially become energy-independent and carbon neutral.

**Samra Wastewater Treatment Plant, Jordan:** This facility is noted for its electricity production from wastewater, both before and after treatment processes.

**Hartford Water Pollution Control Facility, Hartford, CT, USA:** The plant is incorporating an energy recovery facility into furnace upgrade projects, with biosolids incineration expected to generate 40% of the plant’s annual electricity consumption.

**“ These examples showcase the diverse approaches and technologies being implemented worldwide to recover energy from wastewater, contributing to environmental sustainability and reducing carbon footprints ”**

### Case Study : Eskişehir Industrial Zone WWTP:

The WWTP in Eskişehir Industrial Zone, which serves a variety of industries including metal manufacturing and ceramics, faced high operational costs due to its steep energy consumption, amounting to over 700,000 kWh annually.

#### Challenges:

- High energy costs for plant operation.
- A significant carbon footprint from the treatment processes.
- Legal regulations demanding more sustainable operations.

#### Interventions:

- **Renewable Energy Integration:** The plant explored renewable energy potential and proposed a matched renewable energy harvesting plant sizing.
- **Process Optimization:** The plant implemented process optimizations to reduce energy consumption without compromising treatment efficiency.

#### Outcomes:

- **Energy Self-sufficiency:** The plant achieved a significant reduction in energy consumption and moved towards energy self-sufficiency.
- **Cost Savings:** The operational costs were reduced, leading to financial savings for the plant.
- **Environmental Impact:** The carbon footprint of the plant was lowered, contributing to a cleaner environment.

#### Conclusion:

As we conclude our exploration of harnessing energy from wastewater, it's clear that this resource offers more than meets the eye. By embracing the power hidden within our sewers, we can unlock a reservoir of renewable energy that's both efficient and environmentally friendly. This journey of transformation not only redefines waste management but also lights the path toward a more sustainable and energy-secure future for all.

# Future-Ready Data Centers

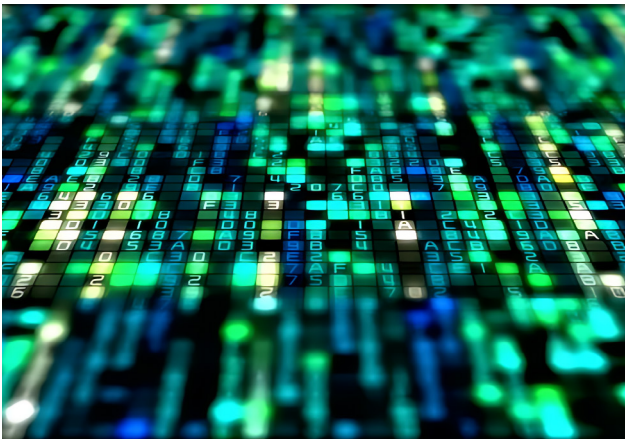
Sustainable Design for  
Reliability and Continuity



In today's rapidly evolving digital landscape, the demand for data storage and processing capabilities continues to surge. As organizations strive to meet this escalating need, the focus on future-ready data centers has become paramount. Future-ready data centers are designed to not only accommodate current requirements but also to adapt and scale in response to the ever-changing technological and environmental landscape. Moreover, sustainable design principles have become integral to the development of these data centers, ensuring reliability and continuity while minimizing environmental impact. This article delves into the significance of future-ready data centers and explores the sustainable design strategies that underpin their reliability and continuity.

### Understanding Future Data Centre

In response to the growing emphasis on environmental responsibility and energy efficiency, future-ready data centers are being purposefully designed to prioritize sustainability. These data centers are engineered with a focus on reducing energy consumption, implementing renewable energy sources, and adopting eco-friendly practices. By integrating sustainable technologies and operational strategies, these data centers aim to minimize their environmental impact while meeting the escalating demands for data processing and storage. Through their commitment to sustainability, future-ready data centers are poised to play a pivotal role in promoting environmental stewardship within the realm of technology infrastructure.



### Eco-Friendly Innovations: Building Future-Ready Data Centers for Unwavering Reliability

In the quest for sustainable and future-ready data centers, eco-friendly innovations have emerged as a cornerstone for ensuring unwavering reliability. These innovations encompass a spectrum of technologies and design principles aimed at reducing energy consumption, minimizing carbon footprint, and optimizing resource utilization. From advanced cooling systems and energy-efficient hardware to renewable energy integration and intelligent infrastructure management, these eco-friendly innovations are not only enhancing the environmental

sustainability of data centers but are also bolstering their reliability by mitigating operational risks and ensuring uninterrupted performance.

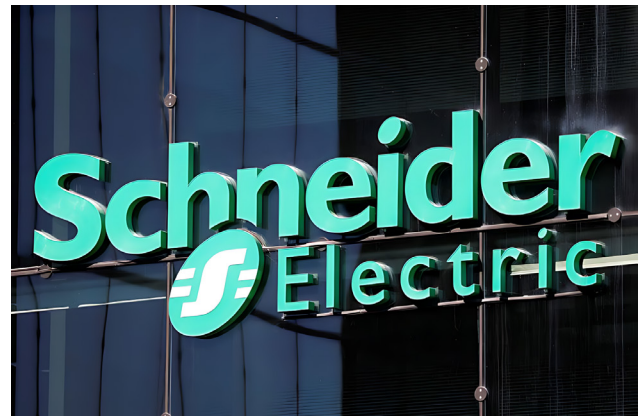
Embracing these innovations is pivotal in fostering data centers that are not only prepared for the future but are also resilient and dependable in the face of evolving technological and environmental challenges.

### Example of specific innovations

#### • Schneider Electric

Schneider Electric actively develops energy management and automation solutions tailored for data center efficiency improvements, partnering with data center operators to reduce energy consumption.

These examples demonstrate a commitment to embracing sustainable and eco-friendly practices, including renewable energy usage, energy-efficient technologies, and innovative cooling solutions. These efforts not only contribute to environmental friendliness but also play a crucial role in reducing operational costs for data center operators in the age of Artificial Intelligence and Quantum Computing.



### Sustainable Strategies: Ensuring Continuity in Future-Ready Data Center Designs

In the context of sustainable strategies for ensuring continuity in future-ready data center designs, a multi-faceted approach is essential. This involves not only implementing eco-friendly technologies but also integrating robust continuity measures to uphold operational resilience. For example, the use of modular designs and prefabricated components in data center construction can minimize waste, optimize energy usage, and facilitate rapid scalability, thereby ensuring continuity in the face of evolving demands.

Additionally, advanced energy management systems, such as dynamic power allocation and smart grid integration, contribute to both sustainability and operational continuity by efficiently balancing power loads and bolstering backup power capabilities. Furthermore, the adoption of predictive maintenance technologies and real-time monitoring tools not only enhances sustainability by optimizing equipment performance but also fortifies the data center's continuity by proactively identifying and addressing potential issues.

By aligning sustainable strategies with measures that fortify operational continuity, future-ready data center designs can effectively navigate the complexities of modern technological landscapes while minimizing environmental impact.

Some specific sustainability examples in the context of future-ready data center designs

- **Renewable Energy Integration**

Data centers are increasingly incorporating renewable energy sources such as solar, wind, and hydroelectric power to reduce their reliance on non-renewable energy and minimize their carbon footprint.

**“ Implementing solar panels on data center rooftops or contracting with wind farms for energy supply are effective ways to integrate renewable energy into data center operations ”**

- **Energy-Efficient Cooling Systems**

Utilizing advanced cooling technologies, such as liquid cooling, hot/cold aisle containment, and free cooling, can significantly reduce the energy consumption of data center cooling systems. By optimizing airflow and temperature control, data centers can enhance their energy efficiency and sustainability without compromising operational reliability.

- **Waste Heat Reuse**

Data centers can capture and repurpose waste heat generated by IT equipment for heating purposes in adjacent offices or residential buildings. This innovative approach not only minimizes energy wastage but also contributes to community sustainability by providing an eco-friendly heating solution.

- **Modular and Prefabricated Construction**

Embracing modular and prefabricated construction methods enables data centers to minimize material waste, optimize construction timelines, and adapt to changing capacity requirements more efficiently.

These approaches align with sustainability goals by reducing construction-related environmental impact.

- **Water Conservation Measures**

Implementing water-efficient cooling technologies and employing water recycling systems can significantly reduce the water consumption of data centers. By minimizing water usage for cooling purposes, data centers can contribute to sustainable water management in regions where water scarcity is a concern.

**The key ways in which sustainable practices can influence operating costs**

- **Energy Efficiency and Cost Savings**

Sustainable initiatives, such as the use of energy-efficient hardware, adoption of renewable energy sources, and implementation of advanced cooling technologies, can lead to substantial reductions in energy consumption. This, in turn, translates to lower utility bills and decreased operational expenses, contributing to long-term cost savings for data center operators.

- **Minimization of Downtime and Maintenance Costs**

Sustainable design elements, such as resilient power systems, efficient cooling solutions, and predictive maintenance technologies, can help minimize the risk of downtime and equipment failures. By reducing the frequency and impact of outages, data center operators can avoid costly disruptions to operations and mitigate the need for extensive maintenance, consequently lowering overall operating costs.

- **Resource Optimization and Waste Reduction**

Sustainable practices often involve optimizing resource utilization and minimizing waste. For example, modular and prefabricated construction methods can streamline resource usage, while waste heat reuse initiatives contribute to efficient resource management. These approaches help reduce unnecessary expenditure and waste disposal costs, positively impacting the overall operating budget.



### Compliance and Regulatory Advantages

Embracing sustainability can position data center operators favorably in terms of regulatory compliance. Adhering to environmental standards and energy efficiency regulations not only mitigates the risk of penalties and fines but can also lead to potential incentives, tax breaks, or other financial benefits, further impacting operating costs.

***“ By considering these factors and implementing sustainable strategies, data center operators can not only enhance the environmental performance of their facilities but also realize tangible cost efficiencies, ultimately contributing to the long-term financial sustainability of their operations ”***

### Greening the Future

Sustainable Design for Reliable and Continuous Data Centers is a crucial initiative aimed at reducing the environmental impact of data centers while ensuring their uninterrupted functionality. One example of sustainable design in data centers is the use of energy-efficient cooling systems, such as free-air cooling and liquid immersion cooling, which minimize power consumption and reduce carbon emissions. Another example is the implementation of renewable energy sources, like solar panels and wind turbines, to power data centers, thereby decreasing reliance on non-renewable energy.

Additionally, the adoption of advanced server virtualization and consolidation techniques can optimize resource utilization, leading to reduced energy consumption and a smaller physical footprint for data centers. These sustainable design strategies not only contribute to environmental conservation but also enhance the reliability and continuity of data center operations.

### What is the projected need for data centers in 2024?

The data center industry is evolving with new applications like artificial intelligence and machine learning, leading to increased demand. Innovative ways to power and cool data centers are being developed, such as using excess heat for greenhouses.

***“ Data center pricing continues to rise due to limited supply and strong demand, with a projected 10% to 15% increase in 2024 ”***

There is a need for new data center development, which is likely to attract more institutional investment in 2024. Power supply in primary markets increased by 19.2% year-over-year in H1-2023, leading to a 25% increase in new data center construction activity.





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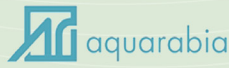
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# Green HYDROGEN

## Top 10 Pioneering Companies in Green Hydrogen Industry

In recent years, the green hydrogen industry has emerged as a pivotal player in the global energy transition. Green hydrogen, produced through the electrolysis of water using renewable energy sources, offers a sustainable and clean alternative to fossil fuels. As the world intensifies its efforts to combat climate change, green hydrogen stands out for its potential to decarbonize various sectors, including transportation, industry, and power generation. The technology has rapidly evolved, and the scale of production has expanded, making green hydrogen a key component in achieving net-zero emissions targets.

### What is the green hydrogen?

Green hydrogen is a form of clean energy that is produced by the electrolysis of water using renewable electricity sources, such as wind or solar power. This process results in significantly lower greenhouse gas emissions compared to traditional hydrogen production methods that use fossil fuels. The importance of green hydrogen lies in its potential to help limit global warming to 1.5 °C, reduce dependence on fossil fuels, and provide a sustainable energy source for various sectors that are difficult to decarbonize, such as heavy industry and long-haul transport. When evaluating the best companies for green hydrogen production, criteria often include:

**Innovation:** The company's ability to develop new technologies for efficient hydrogen production.

**Sustainability:** How the company minimizes environmental impact and uses renewable resources.

**Production Capacity:** The scale at which the company can produce green hydrogen.

**Market Presence:** The company's influence and partnerships within the energy market.

**Financial Stability:** The financial health of the company and its ability to invest in future growth.

**Regulatory Compliance:** Adherence to government regulations and standards for green hydrogen production.

***“ These criteria help in identifying companies that are not only leading in the field but are also contributing to a sustainable energy future ”***

It's important to consider these factors to choose a company that aligns with the goals of reducing carbon emissions and promoting clean energy.

### Advancements in the Green Hydrogen Industry

The green hydrogen industry has witnessed remarkable progress from 2022 to 2024, marked by significant advancements in technology, increased global investment, and a stronger push for decarbonization. The sector has seen a surge in the number of projects, with over 1,000 initiatives catalyzing an investment of approximately £320 billion, although only about 11% have reached the Final Investment Decision (FID) stage,

some examples of this projects are Neom - In Saudi Arabia, this is part of a new sustainable city initiative, with plans to be a hub for green hydrogen production and China's Green Hydrogen Pilot Project -

**“ A project in China exploring the use of green hydrogen in various sectors, including transportation and industry. This growth is fueled by the recognition of green hydrogen’s potential to decarbonize hard-to-abate sectors such as steel, cement, and chemicals. ”**

Moreover, policy and legal frameworks are evolving to support the industry, and international standards are being coordinated to facilitate the global uptake of green hydrogen as a versatile and sustainable energy carrier.

**The top 10 pioneering companies in the green hydrogen industry**

**AMEA Power:** This company is making significant strides in the APAC region, particularly with its green hydrogen project in Egypt. AMEA Power aims to contribute to the global transition toward sustainable energy by leveraging green hydrogen technology.

**Linde:** As a leading supplier of proton exchange membrane (PEM) electrolyzer technologies, Linde plays a crucial role in advancing green hydrogen production. Their integrated solutions enable efficient and scalable hydrogen generation from renewable sources.

**First Hydrogen:** Focused on removing barriers for zero-emission fleets, First Hydrogen offers “Hydrogen-as-a-Service.” By providing turnkey solutions, they facilitate the adoption of green hydrogen across various sectors.

**Air Liquide:** A major player in industrial gases, Air Liquide is actively involved in green hydrogen production. Their expertise spans the entire value chain, from electrolysis to distribution, supporting the transition to cleaner energy.

**Air Products Inc.:** With a global presence, Air Products is a key supplier of hydrogen and related technologies. Their commitment to green hydrogen aligns with the growing demand for clean energy solutions.

**Nel Hydrogen:** Nel specializes in hydrogen production, storage, and distribution technologies. Their electrolyzers contribute to the expansion of green hydrogen infrastructure worldwide.

**Siemens Energy:** Siemens offers a wide range of solutions for the green hydrogen sector, including electrolyzers and power-to-gas systems. Their innovations enhance the integration of renewable energy sources into the grid.

**Engie:** As an energy company, Engie invests in green hydrogen as part of its renewable energy portfolio. Their projects aim to accelerate the adoption of hydrogen-based solutions for a sustainable future.

**bspkl:** Innovating with catalyst-coated membrane technology, bspkl contributes to efficient hydrogen production. Their advancements enhance the overall performance and reliability of green hydrogen systems.

**APGREEN:** Specializing in green hydrogen conversion technologies, APGREEN plays a critical role in advancing the utilization of hydrogen as a clean energy source. Their solutions contribute to reducing carbon emissions and promoting a low-carbon economy.

These companies collectively drive innovation, research, and deployment of green hydrogen technologies, paving the way for a more sustainable energy landscape.



### The Future of the Green Hydrogen Market

Green hydrogen represents a beacon of hope for a sustainable future, offering a clean alternative to fossil fuels. Produced through the electrolysis of water using renewable energy sources, green hydrogen emits no greenhouse gases, positioning it as a key player in the global effort to combat climate change. Its versatility allows it to be used across various industries, including transportation and manufacturing, where it can significantly reduce carbon footprints. As nations worldwide strive to meet climate goals, green hydrogen stands out for its potential to revolutionize energy systems, drive economic growth, and foster a greener planet. With technological advancements and supportive policies, the green hydrogen market is poised for rapid expansion, promising a future where clean energy is not just a concept but a reality.



### How Greenwashing Could Undermine Hydrogen's Future

Green hydrogen represents a beacon of hope for a sustainable future, offering a clean alternative to fossil fuels. Produced through the electrolysis of water using renewable energy sources, green hydrogen emits no greenhouse gases, positioning it as a key player in the global effort to combat climate change.

Its versatility allows it to be used across various industries, including transportation and manufacturing, where it can significantly reduce carbon footprints. As nations worldwide strive to meet climate goals, green hydrogen stands out for its potential to revolutionize energy systems, drive economic growth, and foster a greener planet. With technological advancements and supportive policies, the green hydrogen market is poised for rapid expansion, promising a future where clean energy is not just a concept but a reality.

### The key statistics and facts related to the green hydrogen industry

**Global Interest:** Green hydrogen, particularly derived through renewable-fueled electrolysis, has drawn significant interest as a means to reduce the world's carbon footprint.

**Leading Countries:** As of 2022, Australia was leading with the largest number of green hydrogen plants worldwide.

**Market Value:** The market value of the hydrogen industry worldwide in 2022 was substantial, with forecasts predicting continued growth into 2032 (in billion U.S. dollars).

**Annual Review:** The International Energy Agency's Global Hydrogen Review is an annual publication that tracks hydrogen production and demand worldwide, along with progress in infrastructure development, trade, policy, regulation, investments, and innovation.

**Energy Crisis Impact:** The global energy crisis, particularly sparked by Russia's invasion of Ukraine, has accelerated the momentum behind hydrogen, highlighting its potential to contribute to decarbonization targets and enhance energy security.

**Market Size Report:** Detailed analysis reports are available that cover the green hydrogen market size, share, trends, and forecasts up to 2030.





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# The Future of Power: Integrating Utility-Scale BESS into Power Grids



The integration of BESS with renewable energy projects exemplifies the potential of energy storage systems to enhance the reliability and sustainability of renewable energy generation

The global shift towards green energy is driving the integration of utility-scale Battery Energy Storage Systems (BESS) into power grids. BESS plays a pivotal role in storing excess renewable energy for later use, enhancing grid stability, and meeting peak demand. By leveraging BESS, power grids can better accommodate intermittent renewable sources, mitigate energy fluctuations, and improve overall system reliability. This integration represents a significant step towards a more sustainable and resilient energy infrastructure, supporting the transition to a greener and more efficient power network. Therefore, this article is concerned with the various aspects of Integrating Utility-Scale BESS into Power Grids and explains its importance, benefits, features and examples.

### An Overview of Integrating Utility-Scale BESS into Power Grids

The years 2023 and 2024 mark an era of substantial growth and innovation in integrating Utility-Scale Battery Energy Storage Systems (BESS) into power grids. Projections indicate an accelerating annual growth rate of around 29% for Utility-scale BESS, with anticipated annual installations of 450 to 620 gigawatt-hours by 2030. This surge in utility-scale BESS deployments, driven by the need to balance renewable energy intermittency and provide grid stability services, is poised to capture up to 90% of the total market share by 2030. As BESS providers focus on cost-effectiveness, reliability, and grid optimization solutions, the utility-scale BESS segment is set to play a pivotal role in shaping the power grid landscape in the coming years.



### What is BESS ?

BESS stands for Battery Energy Storage Systems. BESS are systems that store energy from the grid or from renewable sources like solar or wind, and then discharge that energy when it is needed. They can help balance the supply and demand of electricity, provide backup power during outages, and support the integration of renewable energy into the grid by smoothing out the variability of renewable sources. BESS are used at different scales, from small residential units to large utility-scale installations, and they typically use lithium-ion batteries, although other technologies such as flow batteries are also used in some cases.

### The Benefits of BESS

The benefits of Battery Energy Storage Systems (BESS) across different applications and sectors are substantial:

#### Grid Stability and Reliability:

BESS enhances grid stability by balancing supply and demand and providing fast response times, thus improving grid reliability.

#### Integration of Renewable Energy:

BESS stores excess energy from renewable sources, mitigating their intermittent nature and improving grid stability.

#### Peak Shaving and Load Management:

BESS reduces peak demand, lowering electricity costs and reducing strain on the grid infrastructure.

#### Backup Power and Resilience:

BESS provides backup power during outages, enhancing grid resilience and ensuring continuity of power supply.

#### Ancillary Services:

BESS offers ancillary services such as frequency regulation and voltage support, contributing to grid stability and reliability.

#### Emission Reduction:

BESS facilitates the integration of renewable energy and enables more efficient electricity use, contributing to reducing greenhouse gas emissions.

#### Cost Savings:

BESS optimizes energy usage, avoids peak demand charges, and defers the need for costly grid infrastructure upgrades, leading to overall energy cost reduction.

#### Flexibility and Efficiency:

BESS responds rapidly to changes in demand and supply, providing flexibility to the grid and improving system efficiency.

**“ BESS are pivotal in modernizing and enhancing the resilience and sustainability of power systems by offering these diverse benefits ”**

### Battery Dimensioning and Grid Simulation

Battery dimensioning involves determining the optimal size and configuration of a battery energy storage system (BESS) for a specific application. This process considers factors such as the desired energy capacity, power output, and the expected duty cycle of the battery. Grid simulation, on the other hand, involves using computer models to simulate the behavior of the electrical grid under various conditions, including the integration of BESS.

***“ By simulating the grid with the inclusion of BESS, engineers and planners can assess the impact of the storage system on grid stability, renewable energy integration, and economic factors. ”***

These simulations help in understanding how BESS can improve grid performance, reduce peak demand, and support the integration of renewable energy sources.

Computer models such as PSS/E, DIgSILENT Power Factory, GridLAB-D, EMTP-RV, PSCAD, and OpenDSS play a crucial role in simulating the behavior of the electrical grid under different operating conditions, facilitating the assessment of grid stability, power flow, fault analysis, and the integration of renewable energy sources, which are essential for battery dimensioning to determine the optimal size and configuration of battery energy storage systems for specific applications.

These computer models play a crucial role in simulating the behavior of the electrical grid under different operating conditions, facilitating the assessment of grid stability, power flow, fault analysis, and the integration of renewable energy sources.

### Exploring potential market impacts

#### Market Growth and Investment

The global BESS market is forecasted to reach between \$120 billion and \$150 billion by 2030, more than double its size today, indicating substantial market growth and investment opportunities. Providers in the BESS value chain, including manufacturers, integrators, and sales entities, are expected to receive significant shares of the BESS market profit pool, potentially driving economic activity and investment across the value chain.

The examples illustrate how different players in the BESS value chain are influencing revenue distribution, while utility-scale BESS is expected to grow around 29 percent per year for the rest of the decade, indicating significant growth potential in this segment.

**Manufacturers:** Companies such as BYD, LG Energy Solution, CATL, and Samsung SDI have started doing more integration work themselves, impacting the revenue distribution in the value chain.

**System Integrators:** Companies like RWE and NextEra Energy are diversifying and integrating system integration into their offerings, impacting the profit distribution within the BESS value chain.

These examples illustrate how different players in the BESS value chain are influencing the revenue distribution based on their activities and market strategies.

#### Segment Growth

Utility-scale BESS, which already accounts for the bulk of new annual capacity, is expected to grow around 29 percent per year for the rest of the decade, indicating significant growth potential in this segment.





### Market Growth and Opportunities

**Rapid Market Expansion:** The global BESS market is projected to grow at a remarkable rate, reaching USD 8644.19 million by 2028 with a CAGR of 17.59% from 2024 to 2031, presenting substantial growth opportunities for industry players.

**Segmented Market Opportunities:** The BESS market is segmented into front-of-the-meter (FTM) utility-scale installations, behind-the-meter (BTM) commercial and industrial installations, and residential installations, each offering distinct opportunities for growth and innovation.

### Revenue and Investment

**Substantial Investment:** More than \$5 billion was invested in BESS in 2022, indicating a significant increase from previous years and highlighting the growing investment potential in the BESS market, which is expected to reach between \$120 billion and \$150 billion by 2030.

**Diversification of Revenue Streams:** Industry players are exploring strategies such as 'revenue stacking' to leverage the multifaceted capabilities of storage systems for additional revenue streams, showcasing the evolving landscape of revenue generation in the BESS market.

### Examples of BESS integration

**Controlling Fluctuations in Power Output:** BESS combined with solar and wind projects can control fluctuations in power output, allowing for energy to be stored and released to the grid when demand is highest, maximizing output revenue

**Maximizing Renewable Energy Output:** BESS allows renewable energy projects to provide power at both peak and non-peak times, stabilizing the distribution network, generating more revenue for investors and stakeholders, and limiting waste while reducing costs for consumers.

**Stabilizing Power Supply to the Grid:** The attachment of battery systems to renewable energy projects helps stabilize the supply of power to the grid, minimizing voltage distortion, and ensuring a more stable and steady power supply.

**Providing Backup and Grid Services:** BESS integration with renewable energy projects enables backup power in the event of outages and facilitates the provision of grid services, enhancing the overall resilience and reliability of the energy infrastructure.

**Supporting Electric Vehicle Charging Infrastructure:** BESS integrated with electric vehicle charging infrastructure can help mitigate the pressure on the current grid infrastructure caused by the rapid expansion of charging stations and superchargers, thus supporting the growth of electric vehicle adoption.

**Replacing Lead-Acid Batteries in Critical Infrastructure:** BESS, especially lithium-ion products, can replace lead-acid batteries in critical infrastructure such as telecommunication towers, data centers, and hospitals, providing backup power and reducing reliance on less environmentally friendly solutions.

***“The integration of BESS with renewable energy projects exemplifies the potential of energy storage systems to enhance the reliability and sustainability of renewable energy generation while addressing the challenges associated with intermittency and fluctuating energy demand”***

### The Future of BESS

In the years ahead, the future of battery energy storage systems (BESS) will likely be characterized by continued innovation, cost reductions, and widespread adoption. As the world increasingly shifts towards renewable energy sources, BESS will play a crucial role in enabling the efficient harnessing and distribution of this energy. With advancements in battery technology, smart energy management, and favorable regulatory environments, BESS is poised to become an indispensable component of modern power grids, contributing to grid stability, resilience, and the overall transition towards a more sustainable energy future.



# **Investing for a Sustainable Future: A Comprehensive Guide**



**In this comprehensive guide, we will delve into the what, why, and how of sustainable investing, and present an actionable roadmap for making your investments more sustainable**

Sustainability investing has become a significant trend, reshaping the perspectives of businesses and investors regarding investment opportunities. By integrating environmental, social, and governance (ESG) aspects into investment decisions, sustainable investing aims to align financial returns with long-term environmental conservation and societal value.

### Understanding Sustainable Investing

Sustainable investing, also known as ethical investing, green investing, or ESG investing, is an investment strategy that takes into account a company's impact on society and the environment, in addition to its financial performance. It focuses on investing in sectors, companies, or projects that demonstrate strong ESG performance relative to their industry peers.

- **Environmental Factors**

Environmental factors pertain to a company's ecological footprint, encompassing elements like carbon emission levels, waste management practices, water usage, and contribution to biodiversity conservation.

- **Social Factors**

Social factors encapsulate a company's relationship with its employees, customers, suppliers, and the communities where it operates. Factors under this criterion include labor practices, diversity and inclusion policies, and community engagement initiatives.

- **Governance Factors**

Governance factors address a company's management structure, board composition, transparency, and business ethics. This includes aspects such as shareholders' rights, ethical standards, and corporate political contributions.

### Why does Sustainable Investing Matter ?

Sustainable investing has gained significance due to the escalating awareness of global challenges like climate change, resource scarcity, and social inequality. It provides a proactive approach to investing, enabling individuals and institutions to back companies that are instrumental in creating a more equitable and environmentally sustainable world.

- **Financial Performance**

Contrary to the conventional belief that sustainable investing compromises financial returns, research indicates that sustainable funds can perform on par with, and sometimes even outperform, traditional funds. Companies with robust ESG profiles are typically better equipped to manage risks and capitalize on market opportunities.

- **Risk Management**

Sustainable investing can aid in identifying and mitigating long-term risks such as regulatory changes, resource scarcity, and reputational damage.

Companies with sound ESG practices are often better positioned to navigate these risks effectively.

- **Reputation and Brand Value**

Investing sustainably can enhance an individual or an institution's reputation. It signals a commitment to generating positive societal and environmental impact, which can potentially attract more investment and customer loyalty.

### Sustainable Investing Strategies

Sustainable investing strategies can vary significantly, depending on the investor's motivations, values, and financial goals. Here are some common strategies:

- **Negative/Exclusionary Screening**

This strategy involves excluding specific sectors, companies, or practices from a fund or portfolio based on ESG factors. For instance, an investor might choose to exclude companies involved in fossil fuel production or those with poor labor practices.

- **Positive/Best-in-class Screening**

Conversely, positive screening includes investments in sectors or companies selected for their superior ESG performance compared to industry peers. For instance, this could involve investing in companies leading the way in renewable energy or fair trade practices.

- **Impact Investing**

Impact investing targets investments that generate measurable, positive social and environmental outcomes, alongside financial returns. This strategy often focuses on addressing specific global challenges, such as poverty alleviation or clean energy access.

- **Activist Investing**

Activist investing involves buying equity in a company with the intent of influencing its operations, typically to drive ESG improvements.



## Assessing Personal Investment Goals and Risk Tolerance

Before embarking on a sustainable investing journey, it's crucial to assess your personal investment goals and risk tolerance.

### • Financial Goals

Identify your financial objectives, such as saving for retirement, buying a home, or funding education. Your investment strategy should align with these goals.

### • Time Horizon

Consider your investment time horizon, i.e., how long you plan to hold your investments. A longer time horizon usually allows for more aggressive investment strategies.

### • Risk Tolerance

Evaluate your willingness and ability to withstand market fluctuations. Sustainable investments, like any other, carry risks that must be consciously managed.

### • Ethical Considerations

Reflect on your values and the issues that matter most to you. These will guide your sustainable investment choices.

## Developing A Sustainable Investment Strategy

Once you've understood sustainable investing and assessed your personal investment goals and risk tolerance, it's time to develop your sustainable investment strategy.

### • Diversification

Build a diversified portfolio of sustainable investments across various sectors, asset classes, and geographies to reduce risk and enhance long-term returns.

## Implementing The Investment Strategy

After devising a sustainable investment strategy, the next step is its implementation.

### • Selecting a Sustainable Investing Platform or Advisor

Choose a platform or advisor with expertise in sustainable investing to help you build and manage your portfolio.

### • Opening an Investment Account

Open an investment account with a financial institution that offers sustainable investment products and services.

### • Making Initial Investments

Start investing in sustainable assets by purchasing stocks, bonds, ETFs, or mutual funds that align with your investment strategy.

### • Ongoing Investment Management

Monitor your investments and adjust your portfolio as needed to respond to market conditions, changes in your goals or risk tolerance, or new sustainability information.



## Monitoring and Adjusting the Portfolio

Once you've implemented your investment strategy, it's essential to monitor and adjust your portfolio continually.

- **Regularly Reviewing Portfolio Performance**

Evaluate your portfolio's performance against your investment goals and benchmark indices to ensure you stay on track.

- **Adjusting Investments Based on Changes in Goals or Risk Tolerance**

Rebalance your portfolio and adjust your investment strategy as needed to reflect changes in your financial goals, risk tolerance, or ethical considerations.

- **Staying Informed About Sustainability Developments**

Stay up-to-date on sustainability trends, news, and ESG issues to make informed investment decisions and adjust your portfolio as necessary.

## Measuring Impact

Track the social and environmental outcomes of your investments to assess their real-world impact and ensure alignment with your values.

***“ Utilize impact measurement tools and frameworks, such as the Global Impact Investing Network (GIIN) metrics or the United Nations' Sustainable Development Goals (SDGs) ”***

Regularly reporting on your investments' impact can help demonstrate your commitment to sustainable investing and inspire others to follow suit. Some examples of companies that are known for investing in a sustainable future include Tesla, which focuses on electric vehicles and renewable energy; Unilever, which has committed to sustainable sourcing and reducing its environmental impact; and Patagonia, a company known for its commitment to environmental and social responsibility. These companies are just a few examples of those that prioritize sustainability in their business practices and investments.

## Conclusion

Sustainable investing plays a crucial role in promoting positive change by channeling funds towards companies and initiatives that tackle global environmental and social issues. When investors align their investments with their principles, they can contribute to a more sustainable and equitable economy. Investing in sustainability can help establish a stronger and fairer global economy that benefits all parties involved. Companies that prioritize sustainability are better prepared to handle risks, take advantage of opportunities, and generate lasting value for their investors, employees, customers, and communities. Sustainable investing brings lasting advantages for both investors and society. By incorporating ESG factors into their investment strategies, investors can improve their financial returns, mitigate risks, and support a more sustainable future for everyone.





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# ENERGY NEWS BRIEF

———— MAY 2024 ————



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## Australian state offers \$1.6 million for a solar recycling scheme



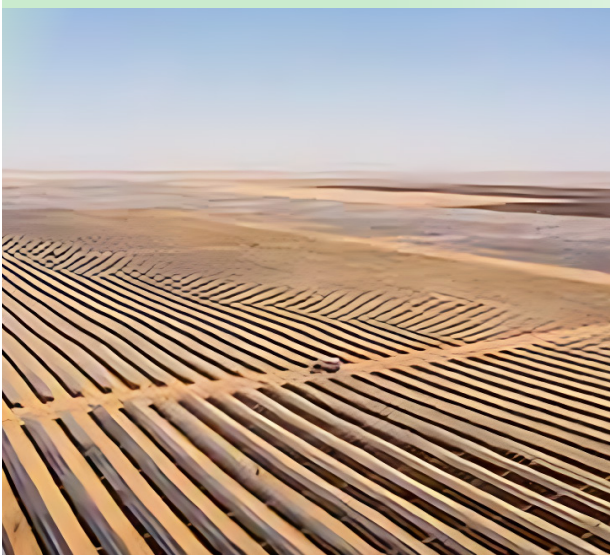
The Australian state of Queensland has committed AUD 2.5 million (\$1.6 million) to develop an "Australian first" solar-panel recycling scheme. The Smart Energy Council (SEC) has secured funding from the Queensland government to develop an industry-led solar panel recycling pilot program in the state, ensuring that broken or end-of-life solar panels are repurposed rather than sent to landfill. In 2019, solar panels accounted for 1,000 metric tons of waste in Queensland, with modeling suggesting that by 2030, PV and battery storage waste in the state will exceed 17,000 metric tons per annum. Researchers from the University of New South Wales (UNSW) have predicted that the national solar waste total could reach 100,000 metric tons per year, equivalent to 1.2 GW per year, by the end of this decade. The next stage of the program will tackle the challenges identified in the initial stage, investigate the collection and disposal of unwanted solar panels from residential, commercial, and large-scale sites, and provide information on reprocessing and recovery costs.

## EnBW seals another PPA for He Dreiht offshore park's output

German steel producer Salzgitter AG will offtake 50 MW of green power from the 900-MW He Dreiht wind project in the North Sea as part of a 15-year power purchase agreement (PPA) signed with EnBW Energie Baden-Wuerttemberg AG. The clean electricity will support Salzgitter's SALCOS project, which aims to decarbonise its steel production operations. The project, which will be built in German waters, is expected to commission by the end of 2025. EnBW has already completed the supplier selection process for the project and expects to make the final investment decision next year.



## Egyptian solar is set to expand beyond the massive 1.8 GW Benban PV project



Egypt's Benban project, completed by Siemens in 2018, is a significant part of the country's solar capacity, providing the largest chunk of Egyptian solar capacity. The project, a complex of 41 separate projects covering 37 km<sup>2</sup>, was completed in 2018-19 and cost a total of \$4 billion to develop. Operators include Voltalia, Infinity Solar, SP Energy, Acciona Energía, Horus Solar Energy, and Scatec Solar. The project has created 6,000 management and maintenance jobs, providing a pool of skilled workers and expertise for future projects. Other installations include a \$4 billion green hydrogen project in the Suez Canal Economic Zone, a 500 MW Abydos project, another 200 MW at Kom Ombo, and a 1 GW solar and 200 MWh battery project. However, challenges remain, including the country's current economic crisis, currency depreciation, and high financing costs due to rising global interest rates.

## Repsol completes the largest solar project yet in Texas

Repsol has completed construction of its largest photovoltaic plant, the Frye Solar project, with a total capacity of 637 MW and 570 MW currently in operation in the United States. The project is located near Kress, Swisher County, Texas and consists of nearly one million solar panels. Repsol has signed a long-term power purchase agreement for 89% of the project's output. The company aims to become a net-zero emissions company by 2050 and has a significant growth ambition in the U.S. with a total renewable capacity of 2,091 MW in Texas. This includes facilities at Frye, Outpost, and Pinnington, as well as existing solar power plants in New Mexico. Repsol also entered the U.S. onshore wind market with the acquisition of ConnectGen. The company's decarbonization strategy aims to reach between 9,000 MW and 10,000 MW of installed capacity by 2027, with 30% of this capacity in the United States.



## Australian water storage facility to house 1 GW pumped hydro station



ZEN Energy plans to convert Sydney's largest water storage facility into a pumped hydro station to support the local grid. The Western Sydney Pumped Hydro project will be located at a former coal washery in Nattai, NSW, and aims to supply 1 GW of clean energy on demand. The project is currently in the consultation phase and, if approved, construction is set to begin in 2027 and be completed by 2031. The system will operate as a closed loop, utilizing water from Lake Burragarang to generate renewable energy without water loss. ZEN CEO Anthony Garnaut highlighted the importance of large-scale energy storage projects in maintaining energy supply as coal-fired power stations retire.

## Voltaia begins construction on 49.9 MW Paddock solar project

Voltaia, an international energy producer, is constructing a 49.9MW photovoltaic power plant in south-east England. The generated electricity will be sold to companies through long-term contracts, including Corporate Power Purchase Agreements. CEO Sébastien Clerc revealed that Voltaia already manages a portfolio of seven solar and storage facilities in the UK, totaling 260 MW. The company has secured additional contracts for solar projects in the UK, signaling its expansion into the renewables sector. Notably, Voltaia has also established a significant solar and battery storage portfolio in the UK and Ireland. This includes a 15-year Corporate PPA with Co-op for a 34 MW solar farm and winning Contracts for Difference to develop two solar projects in the UK, with a combined capacity of 90 MW.



## India's green hydrogen electrolyzer market is poised for growth

The electrolyzer market in China, India, Japan, and South Korea is projected to grow significantly to meet the demand for green hydrogen in various industries, driven by increased production targets under net zero commitments, government policies, investments in renewable infrastructure, and technological advancements. China's market potential is expected to increase from \$22 billion in 2030 to \$85 billion by 2050, with India showing the highest growth, projected to reach \$78 billion from \$4 billion in 2030. The report also emphasizes India's focus on domestic manufacturing capabilities and its potential to become a global hub for electrolyzer manufacturing.



## Mahindra Susten to set up 150 MW hybrid wind-solar plant in India



Mahindra & Mahindra Group revealed plans to develop a 150 MW hybrid solar-wind project in India, valued at INR 12 billion. Mahindra Susten, the group's renewables division, will spearhead the project, with support from Canada's Ontario Teachers' Pension Plan. The installation, expected to be operational within two years, will encompass 101 MW of wind capacity and 52 MW of solar capacity, aiming to produce 460 million kWh of energy and reduce CO2 emissions by 420,000 tons. Notably, this venture marks Mahindra Susten's entry into the "hybrid renewables" sector and is set to be one of the largest projects of its kind, serving customers in Maharashtra. Additionally, the group's renewable energy share is projected to rise from 34% in fiscal 2023 to 60% in fiscal 2026.

## The Hydrogen Stream: Engie confirms termination of H2Sines.Rdam project

Engie has decided to terminate the H2Sines.Rdam project in Portugal, which aimed to produce hydrogen and send it to the Netherlands. Meanwhile, Fortescue has opened an electrolyzer production facility in Australia. The project termination was due to the lack of clear regulations, market maturity, and infrastructure in Portugal. Fortescue's new facility in Gladstone is one of the first in the world to have an automated assembly line and will have the capacity to produce over 2 GW of proton exchange membrane (PEM) electrolyzer stacks annually. Additionally, Fortescue has announced a joint venture with CP Group to supply green hydrogen, ammonia, and fertilizer to Morocco, Europe, and other international markets. This plan includes the potential development of manufacturing facilities and an R&D hub in Morocco. OCP Group, a global company specializing in plant nutrition and phosphate-based fertilizers, is involved in this joint venture.



## EsVolta secures US\$185 million pre-NTP financing for US BESS deployments

EsVolta has secured a US\$185 million senior secured credit facility for its US battery energy storage system (BESS) project pipeline. The funds will enable EsVolta to secure obligations related to interconnection, power purchase agreements, equipment deposits, and early pre-NTP construction funding for its BESS pipeline, which it claims is over 20 GWh. Financial holding company Nomura was the sole lead arranger, bookrunner, and administrative agent for the facility, with participation from Copenhagen Infrastructure Partners and Voya. EsVolta began construction on three BESS projects in Texas in February 2024, totaling 490 MW/980MWh. The Texas market and California are the two largest by BESS deployments in the US, with around 7-8 GW online.



## SSE Renewables launches first operative battery storage project



SSE Renewables has unveiled its inaugural 50MW/100MWh battery energy storage system in Salisbury, Wiltshire. This battery is now actively participating in Great Britain's wholesale energy market. The significance of battery storage lies in its capacity to store and release energy, which is particularly crucial during the transition to net zero. As intermittent generation technologies like solar become more prevalent, efficient energy storage becomes essential. The project was executed in collaboration with technology group Wärtsilä and forms part of SSE's ambitious Net Zero Acceleration Programme, which entails a five-year investment plan exceeding £7 billion. Additionally, SSE Renewables is currently working on a 150MW battery project in Ferrybridge, West Yorkshire, and a 320MW battery project in Monk Fryston, North Yorkshire. Furthermore, Fluence will supply batteries for a 150MW/300MWh battery storage project at Fiddler's Ferry, Warrington, developed by SSE Renewables.

## ESB's co-located BESS project in Scotland given greenlight

ESB, an Irish utility, has received approval for a wind and battery storage project in Scotland. The Chleainsaid Wind Farm will feature 96MW of wind power paired with a 20MW battery system, enhancing grid stability and reducing energy waste. Construction begins in 2026, with operations starting in 2027. Co-locating wind and battery storage is innovative, offering consistent energy supply despite potential battery degradation challenges. This approach aligns with ESB's recent launch of Ireland's largest battery storage project, indicating a strategic move towards sustainable energy solutions.



## Chad opens tender for solar-diesel hybrid projects with battery storage

Chad has launched a tender for the construction of three solar-diesel hybrid power plants with battery storage. The plants will be built in Bongor, Bol, and Biltine, with the African Development Bank funding the Chad Electric Power Sector Support Project (PA-SET). The Bongor plant will have a 2 MW solar plant, 1 MWh of daily storage, and two generators. The Bol and Biltine plants will each have a 1 MW solar plant with 0.5 MWh of daily storage and one 1,000 kVA generator. The tenders must be accompanied by an offer guarantee of XAF 80 million (\$131,000) for the Bongor plant and XAF 40 million for the Bol and Biltine plants.



## Iberdrola sells wind power assets in Romania for €88 million



Iberdrola is progressing with its plan to divest non-core assets, selling its renewable energy assets in Romania to Premier Energy Group for €88 million. This transaction removes Iberdrola's last presence in Romania and is part of the company's strategic plan to rotate €12.2 billion in assets by 2026. Alongside this divestment, Iberdrola has recently closed several major partnerships to advance its decarbonization goals, including expanding a co-investment deal with Norges Bank to 2,500MW in Iberia, a €15 billion offshore wind and green hydrogen agreement with Masdar, and the \$6.2 billion sale of over 8,400MW of gas-fired power plants in Mexico. Iberdrola has also collaborated with GIC, BP, and MAPFRE on various renewable and infrastructure projects.

## PPC Group and MYTILINEOS partner up on 2 GW PV portfolio

PPC Group and MYTILINEOS Energy & Metals have signed a Cooperation Framework Agreement (CFA) to develop and construct a solar project portfolio of up to 2000 MW across Italy, Bulgaria, Croatia, and Romania. Valued at €2 billion, the deal is set to be implemented over the next three years. MYTILINEOS will handle the development and construction of approximately 90 solar projects, which will then be acquired by PPC Group upon completion. This landmark agreement showcases the leading role of Greek companies in the region's energy security and represents a significant step in the energy transition. The green energy projects are expected to power 320,000 households and reduce 3.4 million tons of CO2 emissions.





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# Global Energy Events

## 2024 Intersolar North America and Energy Storage North America

Date: From 16 to 19 Jan 2024

Location: San Diego Convention Center 111

Harbor Dr. San Diego, CA 92101

Intersolar North America and Energy Storage North America highlight the latest energy technologies, services, companies, and organizations striving to create a positive impact on climate change and support our planet's transition into a more sustainable energy future.

Website: [www.intersolar.us](http://www.intersolar.us)

Registration: [www.xpressreg.net](http://www.xpressreg.net)



## Electrical Energy Storage and Technologies Conference

Date: From 29 to 30 Jan 2024

Location: San Diego San Diego, US

EESAT has been the leading technical forum for showcasing advancements in energy storage technologies and applications since 2000. It is currently sponsored by the IEEE Energy Storage and Stationary Battery (ESSB) Committee.

Website: [www.cmte.ieee.org](http://www.cmte.ieee.org)

Registration: [www.cmte.ieee.org](http://www.cmte.ieee.org)



## Hydrogen Live 2024

Date: From 7 to 8 February 2024

Location: Titanic Hotel, Rum Warehouse, Liverpool United Kingdom

Foresight Hydrogen Live 2024 is a premier event focusing on the hydrogen value chain. Taken place on February 7 and 8 at the Titanic Hotel in Liverpool, it offers a valuable opportunity for industry leaders, innovators, policymakers, and investors to collaborate and influence the future of hydrogen.

Website: [www.decarbonisationtechnology.com](http://www.decarbonisationtechnology.com)

Registration: [www.decarbonisationtechnology.com](http://www.decarbonisationtechnology.com)



## Egypt Energy Show

Date: From 19 to 21 February 2024

Location: Cairo

The EGYPES 2024 Conferences help shape the future energy agenda to unlock the potential of the energy transition and drive sustainable production and climate-conscious practices. The EGYPES strategic dialogue focuses on the need for a new global energy system that reduces reliance on single energy sources and supports supply and demand cycles globally.

Website: [www.egypes.com](http://www.egypes.com)



## Go Hydrogen Business

### Summit 2024

Date: From 21 to 22 February 2024

Location: Antwerp Belgium

Go Hydrogen is a business summit focused on practicality, covering important projects, production, and emerging technologies in the hydrogen economy. The summit aims to provide a meeting platform for project owners and off-taker companies to network and conduct business together.

Website: [www.decarbonisationtechnology.com](http://www.decarbonisationtechnology.com)

Registration: [www.decarbonisationtechnology.com](http://www.decarbonisationtechnology.com)



## Wind Energy Asia 2024

Date: From 6 to 8 March 2024

Location: Taiwan

Wind Energy Asia is the only wind industry focused tradeshow in Taiwan. Thanks to its knowledge and vast connections into the local supply chain, allied with its international reputation, Wind Energy Asia provides great business opportunities by gathering international and local players on the best networking platform for the wind industry in Taiwan.

Website: [www.windenergy-asia.com](http://www.windenergy-asia.com)



## Waterpower Week

Date: From 13 to 15 March 2024

Location: Capital Hilton in Washington, D.C.

Waterpower Week 2024 has support opportunities that fit the needs of your budget and will help you surpass your company's marketing goals.

Website: [www.waterpowerweek.com](http://www.waterpowerweek.com)

Registration: [www.edgereg.net](http://www.edgereg.net)



## International Conference on Renewable Energy and Sustainable Energy (ICRESE-2024)

Date: From 25 to 27 March 2024

Location: Paris, France

The conference offers a dynamic blend of expert keynotes, interactive workshops, unparalleled networking opportunities and fostering collaborations that will shape the course of Renewable Energy and Sustainable Energy technology.



Website: [www.conference2go.com](http://www.conference2go.com)

Registration: [www.renewableenergy.com](http://www.renewableenergy.com)

## 26th World Energy Congress

Date: From 22 to 25 April 2024

Location: Rotterdam Ahoy, Rotterdam, the Netherlands

The 26th World Energy Congress was a critical turning point for leadership on clean and inclusive energy transitions worldwide and an opportunity to spring forward in re-designing energy for people and the planet.

Website: [worldenergycongress.org](http://worldenergycongress.org)

Registration: [www.worldenergycongress.org](http://www.worldenergycongress.org)



## Solar & Storage Live Story

Date: From 1 to 2 May 2024

Location: Brisbane Convention & Exhibition Centre

Solar & Storage Live is the world’s largest series of trade shows and conferences organised globally by Terrapinn Limited in the UK, USA, South Africa, Egypt, Saudi Arabia, Philippines, Thailand and Vietnam etc..., and coming to Brisbane, Australia in May 2024.

Website: [www.terrapinn.com](http://www.terrapinn.com)

Registration: [www.secure.terrapinn.com](http://www.secure.terrapinn.com)



## CLEANPOWER 2024 Conference & Exhibition

Date: From 6 to 9 May 2024

Location: Minneapolis, MN | Minneapolis Convention Center

CLEANPOWER® is the clean energy industry’s premier event, bringing policy leaders, industry experts, and major players together for a week of learning, networking and innovation.

Website: [www.cleanpower.org](http://www.cleanpower.org)

Registration: [www.xpressreg.net](http://www.xpressreg.net)



## Future Energy Asia

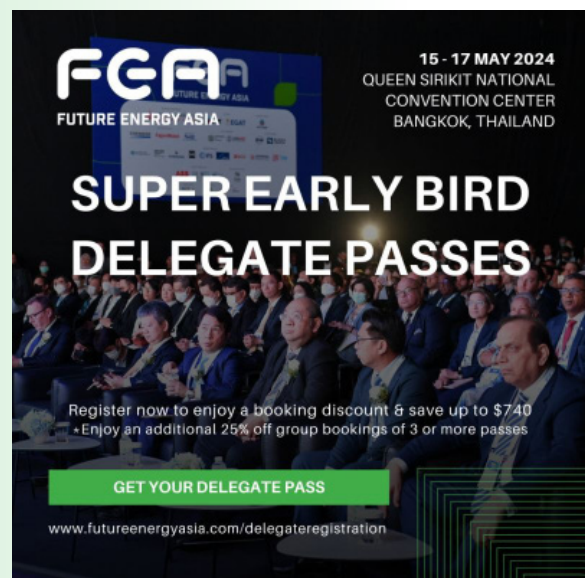
Date: From 15 - 17 May 2024

Location: In Asia

In 2024, Future Energy Asia will host international ministers, Energy CEOs, policymakers, and technical experts to analyze energy trends, drive innovations for the transition to net zero, and build partnerships for accessible, secure, and affordable energy for all.

Website: [www.futureenergyasia.com](http://www.futureenergyasia.com)

Registration: [www.futureenergyasia.com](http://www.futureenergyasia.com)



## PV ModuleTech USA

Date: From 21 to 22 May 2024

Location: Napa, USA

This event will address the module landscape that is expected to unfold for U.S. buyers in the coming years; in particular new domestic manufacturing. Special attention will be given to the module offerings, full value-chain traceability and the financial health of the companies currently supplying the market.



Website: [www.pv-tech.org](http://www.pv-tech.org)

Registration: [www.moduletechusaenergyevents.com](http://www.moduletechusaenergyevents.com)

## Energy Powering Opportunity

Date: From 11 to 13 June 2024

Location: BMO Centre at Stampede Park - Calgary, Canada

The Global Energy Show Canada is the largest B2B exhibition and conference engaging with industry buyers and sellers, CEOs, young professionals, stakeholders and partners together to share knowledge and fuel innovation in the ever-changing energy landscape.

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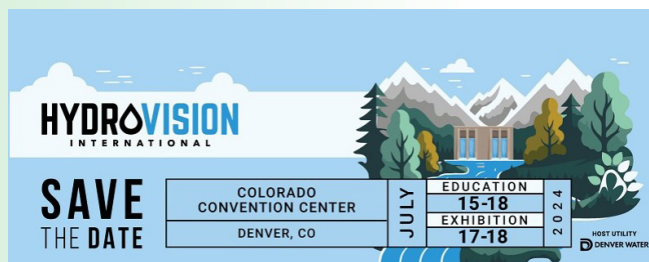
Registration: [www.globalenergyshow.com](http://www.globalenergyshow.com)

## Hydrovision International

Date: From 15 to 18 July 2024

Location: Denver, Colorado, USA | Colorado Convention Center

The conference and exhibit provide an unparalleled platform for learning and procurement that addresses every facet of hydropower, spanning Operations and Maintenance, Environmental Issues and Water Management, Equipment and Technology, Industry Trends and Analysis, and New Development.



Website: [www.hydroevent.com](http://www.hydroevent.com)

Registration: [www.hydroevent.com](http://www.hydroevent.com)

## 2024 World Battery & Energy Storage Industry Expo (WBE 2024)

Date: From 8 to 10 August 2024

Location: Guangzhou, China

WBE has developed into a professional exhibition with the largest number of exhibitors in battery enterprises and the highest participation of professional visitors and foreign buyers. Relying on its worldwide influence and thousands of overseas buyers.



Website: [www.en.battery-expo.com](http://www.en.battery-expo.com)

Registration: [www.en.battery-expo.com](http://www.en.battery-expo.com)

## ICBR 2024 International Congress for Battery Recycling

Date: From 10 Sep to 12 Sep 2024

Location: Basel, Switzerland

ICBR 2024 is the global platform for addressing challenges in the battery recycling industry. For 29 years, ICBR has united experts and decision makers from the entire battery recycling value chain, including recyclers, manufacturers, collection organizations, OEM's, policymakers, materials and services providers, and more.



Website: [www.events.icm.ch](http://www.events.icm.ch)

Registration: [www.events.icm.ch](http://www.events.icm.ch)

## WindEnergy Hamburg 2024

Date: From 24 to 27 September 2024

Location: Hamburg, Germany

WindEnergy Hamburg is one of the world's biggest and most important wind business platforms for exchanging news and views, building networks and closing major deals. National and international wind industry associations cooperate with WindEnergy Hamburg and encourage their members to attend.



Website: [www.windenergyhamburg.com](http://www.windenergyhamburg.com)

Registration: [www.windenergyhamburg.com](http://www.windenergyhamburg.com)

## The Energy Event of Finland

Date: From 22 to 24 October 2024

Location: Tampere

The largest energy event in Finland brings together energy production, power transmission and storing, energy users, environmental and circular economy and real estate decision makers under the same roof in October. The event will showcase sustainable, smart, productive, and modern solutions to the energy transition.

Website: [www.energiamesut.expomark.fi](http://www.energiamesut.expomark.fi)

Registration: [www.energiamesut.expomark.fi](http://www.energiamesut.expomark.fi)



## HYDRO 2024

Date: From 18 to 20 November 2024

Location: Messe Congress Graz (MCG), Austria

The HYDRO 2024 Technical Exhibition will showcase the most active and innovative companies in the hydropower and dams industry worldwide. Click on the button below to see the latest list of exhibitors, or to book a stand.

Website: [www.hydropower-dams.com](http://www.hydropower-dams.com)

Registration: [www.hydropower-dams.com](http://www.hydropower-dams.com)



## 6th Annual International Summit and Exhibition Balkan's Power

Date: From 4 to 5 December 2024

Location: Sarajevo, Bosnia and Herzegovina

6th Annual International Summit and Exhibition: Balkan's Power is a professional platform, bringing together chief ministers, major investors, decision-makers of the leading hydro, wind and solar power plants and investment project initiators, as well as regulators, to consolidate efforts focused on efficient implementation of key projects for the construction and reconstruction of power plants across Balkan region.

Website: [www.balkanspowersummit.com](http://www.balkanspowersummit.com)

Registration: [www.balkanspowersummit.com](http://www.balkanspowersummit.com)



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