

Energy and Water Guide 2026/27

Partnerships and Perspectives of Arab-German Cooperation

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Energy & Water Guide 2026/27

Partnerships and Perspectives of Arab-German Cooperation

Ghorfa
غرفة التجارة والصناعة العربية الألمانية
Arab-German Chamber of Commerce and Industry e.V.
50 YEARS
1976 - 2026

Preface

A decade ago, resilience in the energy and water sectors meant redundancy: a second pump, a spare turbine, a backup line. Today it means intelligence: systems that sense threats before outages occur, plants that adapt before demand becomes a bottleneck, and markets capable of absorbing hydrogen before capacity becomes stranded. The contributions in this edition of the Arab-German Energy & Water Guide reflect that shift.

Few sectors carry as much weight today as energy and water. No longer back-office utilities, they are the foundation of industrial diversification, climate commitments and digital transformation. Throughout this Guide, one argument emerges clearly: infrastructure delivers value when designed from the outset as a system.

This edition brings together perspectives spanning proven technologies and emerging markets. BAE Batterien draws on more than a century of German battery manufacturing serving renewable and back-up power applications across the Arab world. ILF Consulting Engineers addresses hydrogen and what is required to turn ambition into functioning markets, using the example of Jordan, a question GIZ examines from a different angle through its work on renewable energy and hydrogen cooperation in Algeria. Heinz J. Sturm argues that hydrogen becomes a market only when production, infrastructure and real demand are designed together from the outset, and shows how GCC Countries can secure access to European demand. Infrastructure partners such as Max Streicher provide the pipelines and energy networks needed to enable this transition. COSICURA highlights how the control room, increasingly powered by artificial intelligence, has become as strategic as the plant it protects.

Deutsche Wasser International contributes experience from the long-term operation of public utilities. Wilo demonstrates how the infrastructure supporting today's expansion of artificial intelligence and data centers ultimately depends on pumps, cooling and water management. Dorsch Global shows why water infrastructure, from major urban utilities to large-scale desalination, should be planned as an integrated system.

These developments are interconnected. Germany's engineering expertise and the Arab world's industrial ambition have built genuine trust over decades. The Ghorfa Arab-German Chamber of Commerce and Industry has long facilitated this exchange, connecting German technology and expertise with priorities, capital and momentum of the Arab World. Challenges persist: increasingly sophisticated cyber-threats, developing hydrogen markets and urgent water stress. Yet this Guide's contributions show an industry increasingly approaching these challenges not merely as obstacles, but as design problems to be solved.

We thank the contributing companies for their valuable insights, Mr. Mohamed Meskour and Ms. Margarita Zilinskaya for their efforts, commitment and dedication to the publication, and Mr. Fadhl Al-Romaima for the layout and design. We hope this edition provides both insight into where the sector stands today and inspiration for the projects still to come.



Olaf Hoffmann



Abdulaziz Al-Mikhlafi

Olaf Hoffmann
President

Abdulaziz Al-Mikhlafi
Secretary General

»The reliable power supply enables essential services to operate efficiently and continuously, even in isolated desert regions. Based on the success of these projects, BAE has decided to found BAE Batteries Middle East and subsequently strengthen its position in the region in the field of critical infrastructure and renewable energy.«

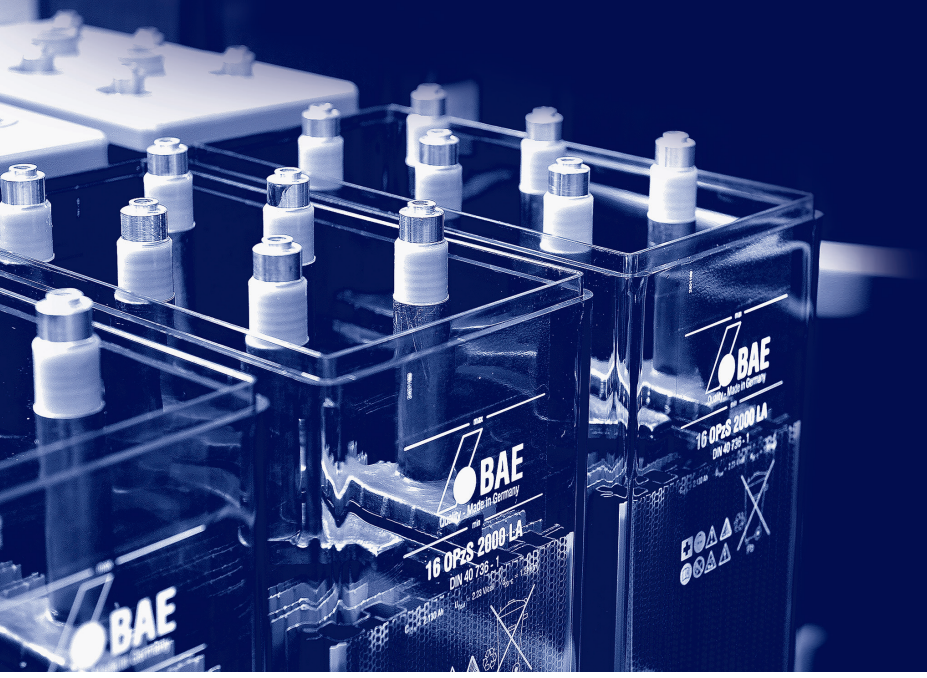
Jan IJspeert, CEO, BAE Batterien GmbH



Energy Storage and Power Solutions

BAE
Reliable Energy

MADE IN GERMANY
Quality since 1899





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Premium Lead Batteries for Stationary and Renewable Energy Applications

BAE Batterien GmbH

Since 1899 BAE stands synonym for proven reliability in the market for industrial lead batteries and system solutions. Nowadays the core business is the production of premium and sustainable lead batteries for stationary and renewable energy applications. BAE excels in its customer orientation and highest quality „Made in Germany“ is our hallmark. Outstanding quality, highest reliability and sustainability are the core elements of the long-lasting proven success of our premium products and company philosophy.

Outstanding quality, highest reliability and sustainability are the core elements of the long-lasting proven success of our premium products and company philosophy.

Our aim is simple: “The chemistry must be right.”

The same chemistry we feel in the cooperation with the dedicated management and team of the Ghorfa for many years.

HISTORY

BAE Batterien GmbH and its predecessors have a unique history as well as Berlin, which was called “Elektropolis” by the end of the 19th century. The developments in the electrotechnical industry were driven in those days well into the 20th century by renowned companies like AEG and Siemens. BAE Batterien is also a part of this unparalleled



© BAE Batterien GmbH

history as, in 1899, the "Akkumulatorenwerke Oberspree AG" was founded in Berlin-Schöneweide by Ludwig Loewe. The accelerator to this settlement was the founding of „Allgemeine Elektrizitätsgesellschaft" (AEG) in Berlin Schöneweide by the famous Emil Rathenau.

In 1901 the AO was taken over by the "Akkumulatorenfabrik AG" (AFA). In 1904, AFA founded at the current BAE Batterien location VARTA - one of the most recognized international battery brands, and all production activities of the AFA were concentrated in Berlin-Schöneweide. In 1922, the AFA was taken over by Guenther Quandt and the company became one of the largest producers of lead batteries.

In 1945, the new company "Akkumulatorenfabrik Oberschöneweide" (AFO) was created. A decade later, in 1958, the "Berliner Akkumulatoren- und Elementefabrik" (BAE) was finally founded, caused by the merger of the AFO and the "Berliner Elementefabrik". BAE focused on producing a broad range of batteries for all kinds of applications including primary batteries. However, the focus was particularly on the supply of batteries for railway applications and BAE became the largest supplier for railway batteries to the former Comecon countries by the end of the eighties.

As the production location of BAE is in the former eastern part of Berlin, BAE was privatized in 1993 and BAE Batterien was founded. After the privatisation in 1993 BAE introduced straight away new product lines for backup power which nowadays is the core business of BAE.

Over the last decade, BAE heavily increased the activities in research and development and continuously extended its product range, e.g. maintenance-free batteries and renewable energy batteries. While doing so, BAE has become a well-established and renowned manufacturer in the premium market for industrial batteries. BAE is a truly global player via its international partner network with a clear focus on the MENA region.







MADE BY HAND AND PASSION © BAE Batterien GmbH

MADE BY HAND AND PASSION

For decades, high-quality and reliable BAE batteries are manufactured through the manual assembly of individual components and sub-assemblies. This manufacturing process enables precise workmanship and helps to ensure compliance with the highest quality standards.

Critical manufacturing steps are subjected to 100% testing during production to ensure compliance with defined specifications. Through the continuous improvement of all processes, BAE is able to ensure consistently high quality.

BAE's quality management system ensures compliance with all quality-related requirements throughout the entire manufacturing process. This includes both the use of high-quality components, all deriving from the EU-27, and the systematic monitoring and documentation of production and testing procedures.

PRODUCT OVERVIEW

Back-up Power Applications

BAE stationary batteries are used wherever perfectly reliable power supply has to be ensured, both for a few seconds and for hours. Typical applications are Uninterrupted Power Supply (UPS) systems such as those found in power plants, data centers, telecommunication installations or hospitals and airports.

Renewable Energy Applications

BAE solar batteries are used in renewable energy applications such as photovoltaic power generation. They are used in hybrid applications as well as in stand-alone photovoltaic systems, which include a very wide range of sizes and application fields. So BAE solar batteries have been proven in industrial energy systems even under extreme conditions as well as in private households, e.g. to increase the content of self-consumed solar PV energy.

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LONGER LIFE.
LOWER CARBON FOOTPRINT



PREMIUM LEAD BATTERIES
SUPPORTING DECARBANIZATION

MANUFACTURED IN GERMANY
Produced in Germany under the highest environmental and quality standards.

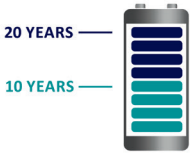
15 - 20 YEARS SERVICE LIFE
Up to twice the lifetime of typical market batteries (7 - 10 years).

EUROPEAN COMPONENTS
Components sourced from the EU ensuring reliable supply and transparent production.

UP TO 99% RECYCLABLE
Supporting a circular economy through established lead recycling.

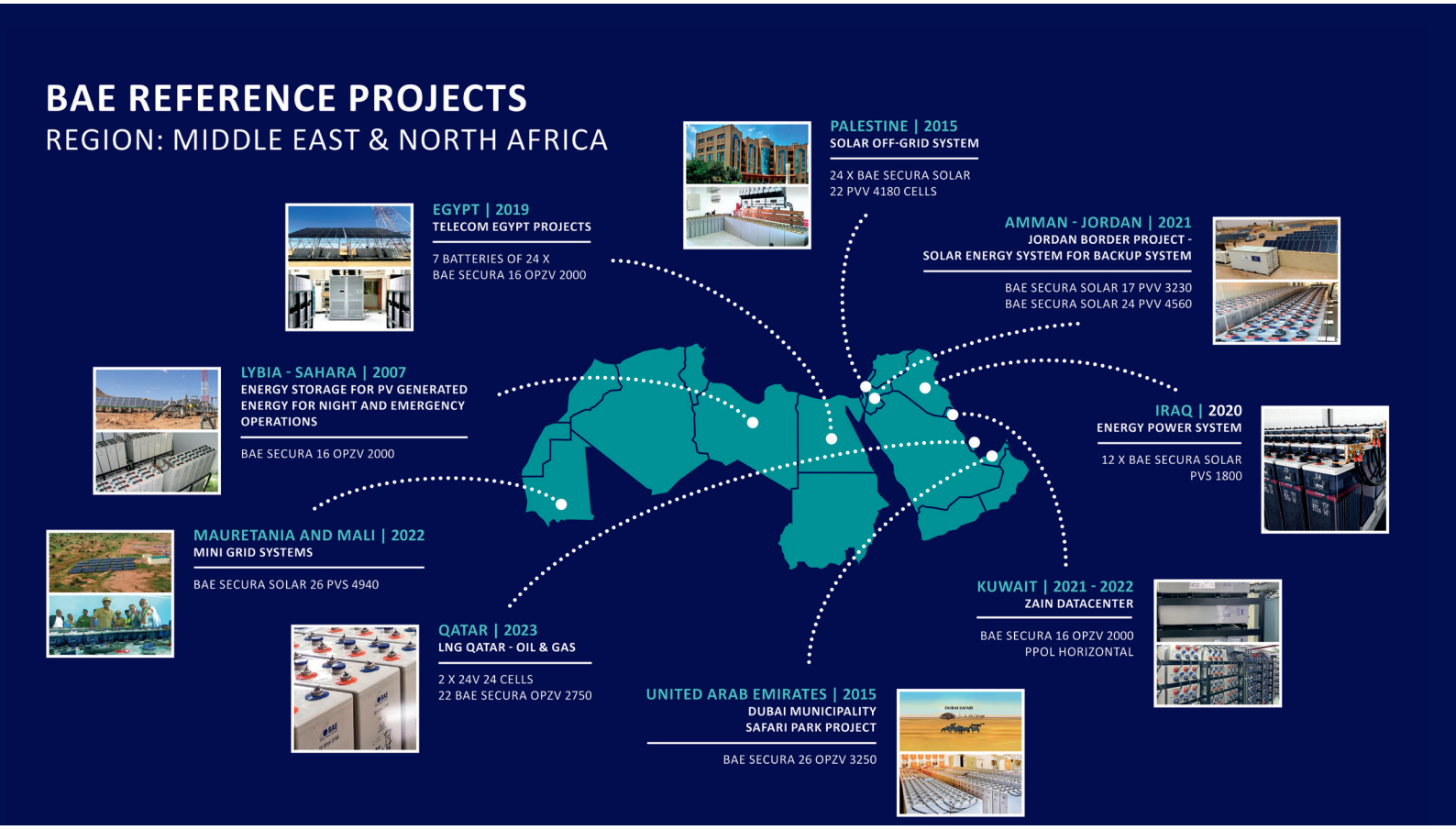
LOWER LIFECYCLE CARBON FOOTPRINT
Fewer replacements, fewer shipments and less material consumption over the product lifetime.

BATTERY LIFETIME



TYPICAL MARKET BATTERY
7 - 10 YEARS

BAE BATTERY
15 - 20 YEARS

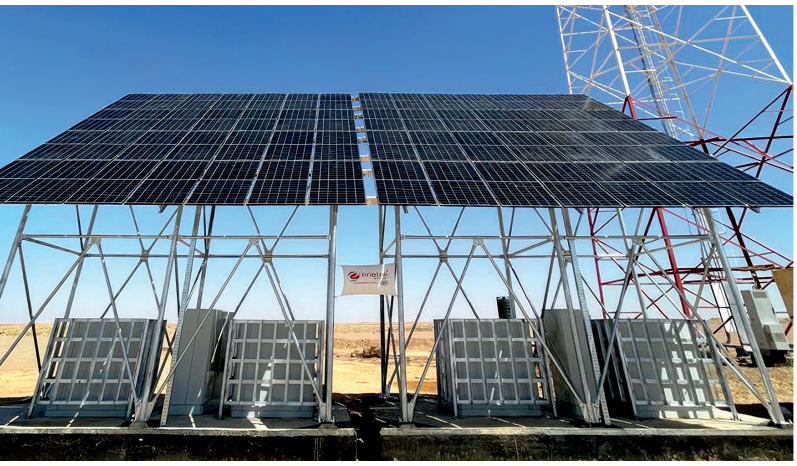


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PROJECTS AND REFERENCES

EGYPT

Since 2014, BAE Secura batteries have been successfully represented in Egypt through its long-standing partner Enetek Egypt, also a member of the Ghorfa, providing high-quality and reliable battery solutions for the telecommunications and industrial sectors. Over the years, more than 1,000 battery banks have been successfully installed across the country, demonstrating the performance, reliability, and durability of BAE Secura's products. Through its close cooperation with Enetek Egypt, the company has established itself as a trusted partner, bringing international expertise, innovative energy solutions, and extensive technical experience to the Egyptian market while supporting customers with dependable power systems for critical applications.







JORDAN PROJECT

With MTSC, another Ghorfa member, BAE implements several projects in Palestine and Jordan in the field of renewable energy. The International Organization for Migration (IOM) Jordan Border Project provides reliable and sustainable electricity to remote governmental institutions along the Jordanian border while minimizing operational costs. Due to the lack of grid access in locations such as Al-Ruwaished, Al-Hadalat and Ruqban, an off-grid photovoltaic system was identified as the most efficient and economic solution. Since the first installation in 2018, the combination of high-quality solar panels, premium battery storage and advanced battery inverter technology has ensured a dependable power supply at very low operating costs. Jordan has approximately 320 sunny days per year, making solar energy an ideal choice for these remote sites. The stand-alone systems provide continuous electricity for offices and accommodation, guaranteeing uninterrupted operation at all times. Through this project, IOM supports the Jordanian authorities while contributing to sustainable energy use and reducing dependence on diesel generators. The reliable power supply enables essential services to operate efficiently, even in isolated desert regions. Based on the success of these projects, BAE has decided to found BAE Batteries Middle East and subsequently strengthen its position in the region.







CLIENT TESTIMONIALS



“

As part of its collaboration with BAE, MTSC supplied a total of 28 energy containers for IOM projects in 2018, 2019, 2020, and 2022. This successful partnership underscores both companies’ expertise in implementing challenging energy projects.

In addition, MTSC and BAE have successfully completed numerous other projects. These projects demonstrate their many years of experience and successful collaboration in implementing sustainable energy projects across a variety of application areas.

MTSC MOBILE TELEPHONE SYSTEM COMPANY | **WAEL FAQEYAT**
CEO, MTSC

MEMBER OF: Ghorfa Arab-German Chamber of Commerce and Industry e.V.



© BAE Batterien GmbH

TRADE FAIRS

BAE Batterien GmbH can look back on a long-standing tradition of successful trade fair participation. As early as the 1960s, the former Berliner Akkumulatoren- und Elementefabrik (BAE) showcased its innovative battery portfolio at internationally renowned industry exhibitions, demonstrating its technological expertise and strong market position.

With the continuous expansion of its global partner network, BAE intensified its international presence from 2010 onwards, further establishing itself as a premium manufacturer of industrial batteries. Today, the company is a regular exhibitor at some of the most important trade fairs in the energy, infrastructure, and industrial sectors worldwide.

Among the key events are Intersolar/EES Europe and InnoTrans Railway exhibition in Germany. In the MEA-Region the Middle East Energy in Dubai, the World Future Energy Summit in Abu Dhabi as well as Oil & Gas Asia (OGA) and the IEEE Power Talks in Oman. These internationally recognized platforms provide BAE with the opportunity to present its high-performance energy storage solutions, engage directly with customers and partners, and strengthen relationships with industry experts and stakeholders.

Beyond these flagship events and delegation trips, BAE participates in numerous additional trade fairs around the world. With 12 to 16 exhibitions per year, the company underscores its global orientation and its commitment to fostering long-term customer relationships, driving technological innovation, and advancing modern energy storage solutions.

This ongoing presence at major international industry events not only strengthens the global visibility of the BAE brand but also creates valuable opportunities for knowledge exchange, market development, and the advancement of future-oriented energy solutions.



Jan IJspeert
CEO

BAE Batterien GmbH



Katja Vallentin
Head of Sales

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Hussain Ali
Area Manager Middle East and Africa

BAE Batterien GmbH



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Renewable Energy and Hydrogen

Green Hydrogen Development in MENA: From Ambition to Implementation – Insights from Jordan

ILF Consulting Engineers

The sector of green hydrogen is moving, albeit sluggishly, as a critical pillar of global decarbonisation, with resource-rich regions such as the Middle East and North Africa sustaining attention. While strong renewable potential underpins ambitious project pipelines, evolving market realities, infrastructure needs, and policy dynamics in the region are reshaping how hydrogen strategies are translated into viable, large-scale investments.

Introduction

Green hydrogen is increasingly recognised as a strategic enabler of deep decarbonisation in energy-intensive sectors in industrialized nations in Europe and East Asia. However, its development pathway—particularly in resource-rich regions such as the Middle East and North Africa (MENA)—is undergoing a critical phase of recalibration. While strong renewable energy potential and export ambitions continue to drive interest, evolving market realities, financing constraints, and policy uncertainties are reshaping how projects are being conceptualised and implemented. Most prominent are the winds of change in the political will of Europe, which has been at the forefront of all major initiatives in the sector. The struggles are to ensure technical and financial feasibility of the full value chain – production, storage, transportation, re-conversion and usage – in the absence of which the future remains uncertain.

A Sector at a Turning Point

The green hydrogen sector in MENA has been closely linked to anticipated long-term demand in Europe and Asia. Initial forecasted demand as per IEA was 430 to 450 million tonnes by 2050, indicating the need to meet decarbonization initiatives under the Net-Zero Scenario under the Paris Climate Agreement of 2015. This expectation has led developers to concentrate project pipelines in countries with high solar and wind potential to target comparatively low levelised cost of electricity, as seen in Saudi Arabia's NEOM project, Oman's Duqm hub, and Morocco's large-scale export-oriented initiatives.

At the same time, several structural challenges have emerged:

- Uncertainty around offtake agreements and demand materialisation: Many large projects (e.g., NEOM, Oman HYPORT Duqm) have progressed through early development without fully secured long-term binding offtake contracts, relying instead on MoUs with European and Asian buyers or tying in captive project development where Original Equipment Manufacturers (OEMs) are offtakers themselves as seen in the NEOM Green Hydrogen Project.

- Financial viability concerns affecting final investment decisions: High capital intensity and unclear revenue frameworks have delayed FIDs in projects such as Oman's early auctioned blocks and several Moroccan export projects where hydrogen derivatives pricing remains uncompetitive versus alternatives.

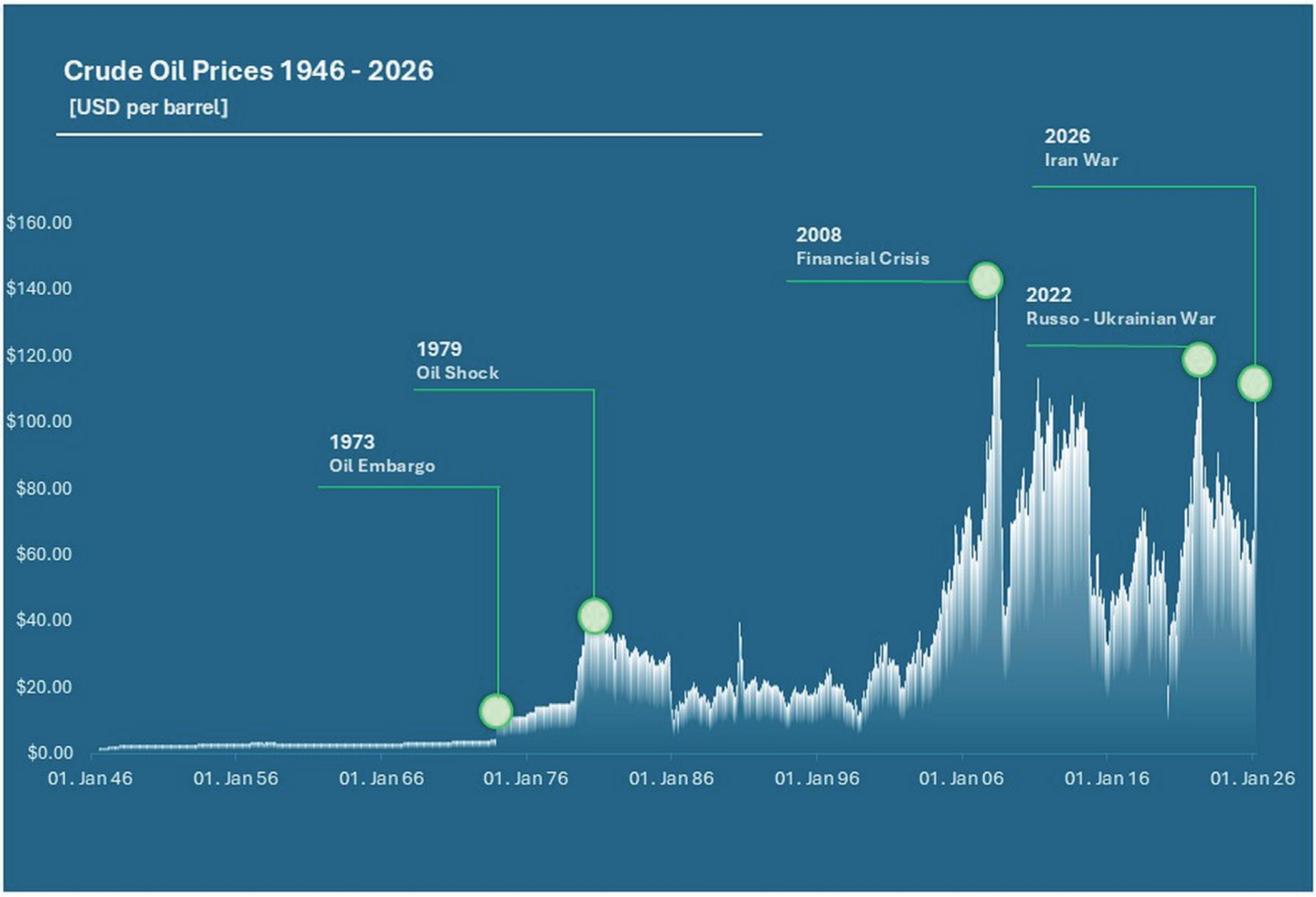


Figure 1 Crude oil price shocks against historical and current events 1946 - 2026; Source: ILF Consulting Engineers Data: https://tradingeconomics.com/commodity/crude-oil

- Project cancellations and delays at gigawatt scale: Multiple announced giga-scale developments have been postponed or downsized, for example, delays in Egypt's SCZone projects and slower-than-expected progress across Saudi Arabia's second-wave hydrogen clusters beyond NEOM.

- Emerging shifts in political priorities and policy frameworks: Policy shifts directly shape hydrogen demand by defining market eligibility, pricing support, and access conditions. Stricter certification requirements can reduce the pool of qualifying supply, while changes in subsidies, carbon pricing, or import incentives influence offtakers' willingness to pay and commit to long-term contracts. At the same time, increasing emphasis on domestic production, local content, and energy security can limit import demand from regions such as MENA. Delays or adjustments in sectoral mandates further impact the scale and timing of demand materialisation. As a result, policy uncertainty often translates into tentative, non-binding offtake agreements, constraining bankability and slowing overall market development.

These factors have created a feedback loop in which supply-side investments depend on demand-side certainty, while demand remains contingent on competitive supply. As a result, the sector is transitioning from rapid announcement phases to more cautious and structured development approaches, with greater emphasis on phased scaling, anchor offtakers, and domestic market integration.

Recalibration and Persistence of Policy Objectives

Despite current challenges, the underlying drivers of green hydrogen remain intact. Decarbonisation continues to be a time-bound and globally relevant priority, reinforced by energy security concerns and geopolitical developments.

Recent global disruptions have highlighted the risks associated with concentrated energy supply chains, especially emanating out of the Ukraine-Russia conflict that impeded natural gas supplies and the recently initiated USA-Iran conflict that has disrupted the oil market adversely. As of now, the world realizes the importance of diversification and self-reliance and to ultimately learn from the double whammy oil shocks of 1973 and 1979, despite traction into renewables following the shock of 2008.

In this context:

- Renewable-rich countries should aim to leverage domestic resources for long-term economic positioning.
- Industrialised regions seek to diversify energy imports and decarbonise value chains simultaneously.
- Governments continue to explore frameworks that balance export ambitions with domestic benefits.

This evolving landscape underscores that while project timelines may shift, strategic intent remains largely consistent to absorb the delay currently being faced due to the doldrums of the financial and the investment market.

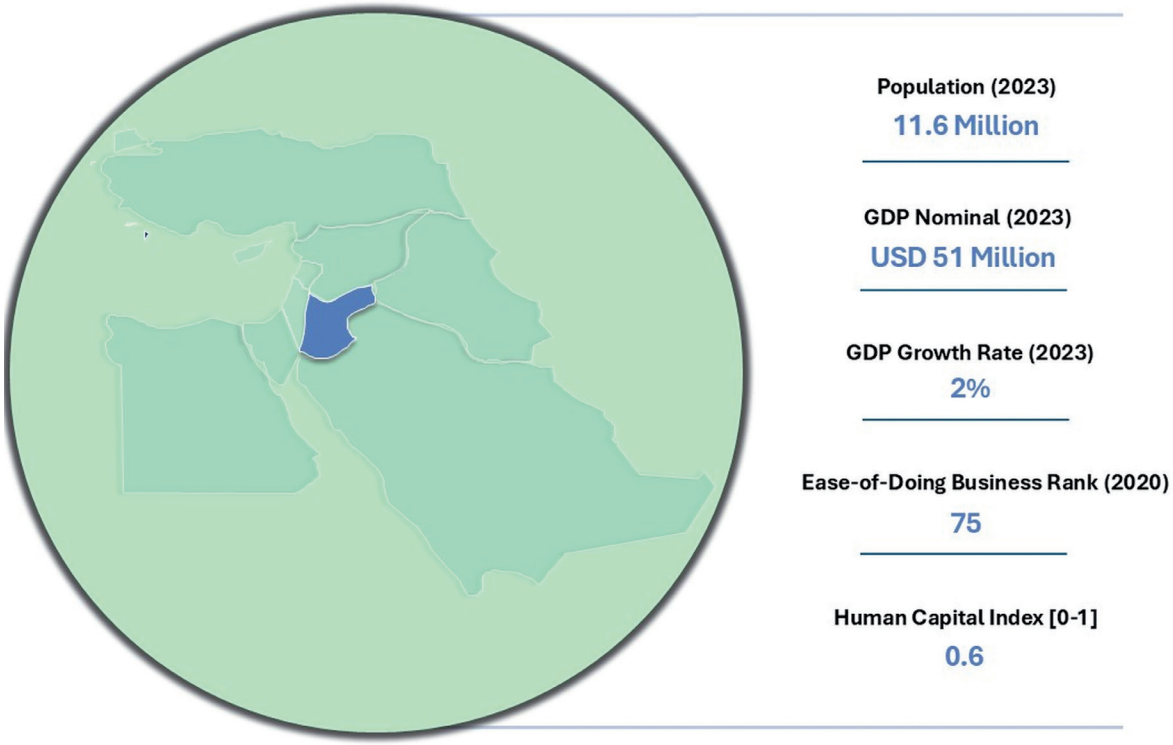
Jordan as a Case Study for Structured Development

ILF Consulting Engineers' (ILF) teams are currently working on an interesting assignment in Jordan – the possibility of cementing the production value chain with Common-Use Infrastructure, or CUI as the foundation for a collaborative environment. The country by itself proffers several enabling characteristics:

- Availability of extremely rich renewable energy sources, especially solar;
- Strategic geographical location with maritime access;
- Existing industrial linkages, particularly in fertiliser production within the port industrial zone; and
- Government's proactive willingness to support sector development.

Figure 2 Hashemite Kingdom of Jordan

Source: ILF Consulting Engineers



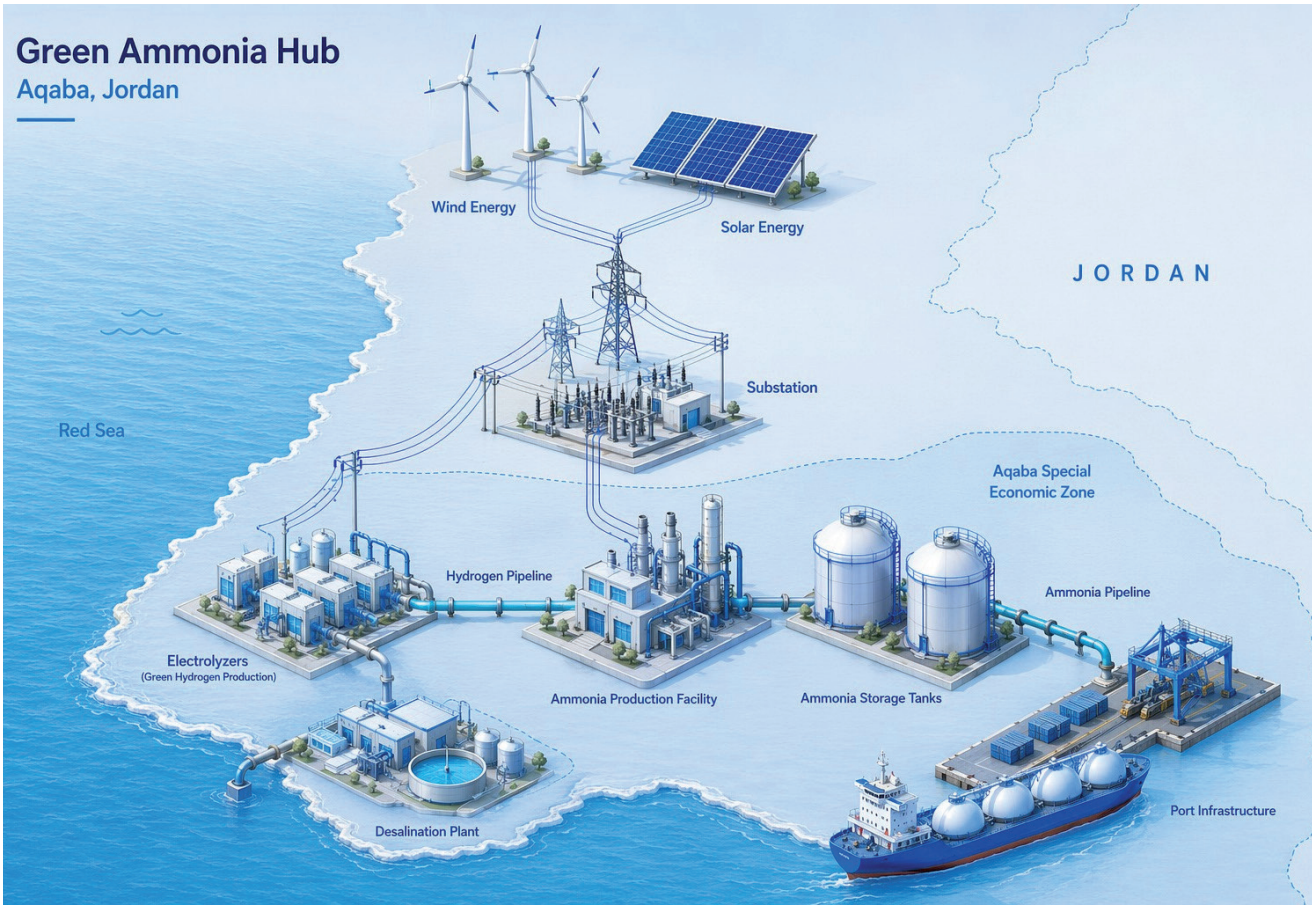


Figure 3 Green Hydrogen Project Development in Jordan

Source: ILF Consulting Engineers Germany

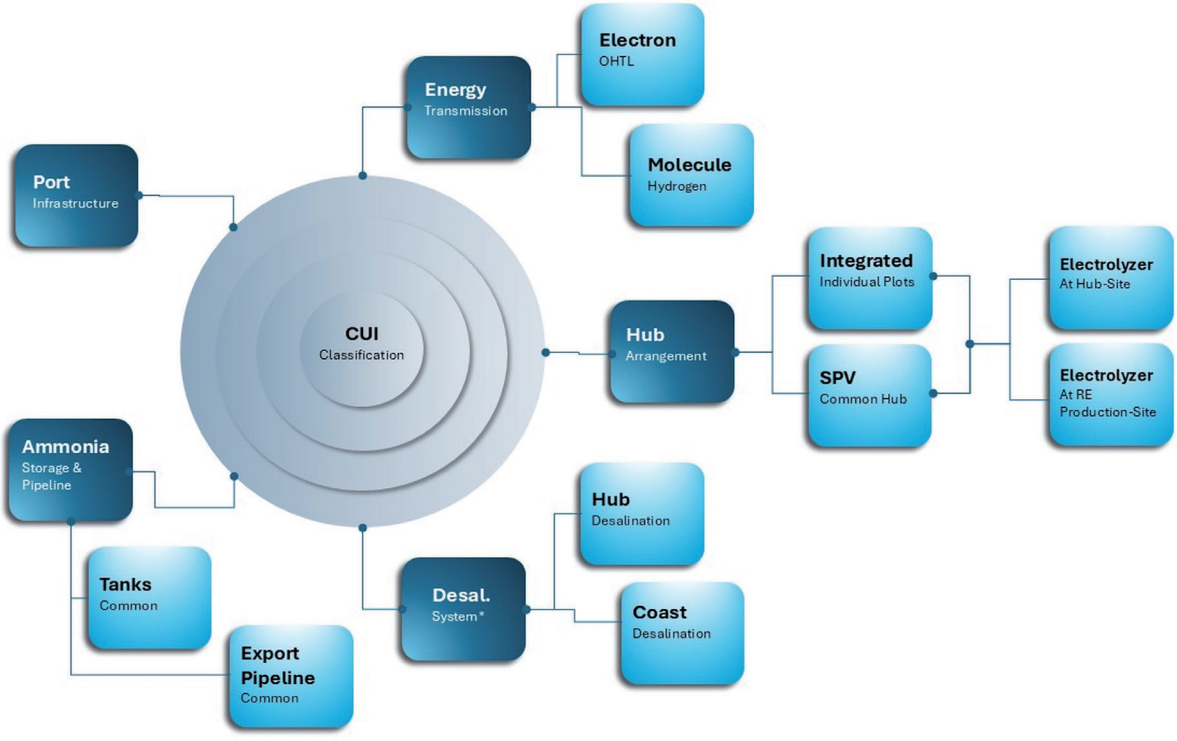


Figure 4 CUI Classification for Green Hydrogen and ammonia project development

Source: ILF Consulting Engineers Germany

At the same time, Jordan faces constraints such as limited water resources and infrastructure requirements, necessitating integrated and carefully sequenced planning.

Recent initiatives have focused on aligning technical, regulatory, and commercial frameworks to support sector development. Particular emphasis has been placed on establishing a common-use infrastructure (CUI) approach, enabling multiple developers to share key assets such as water supply systems, pipelines, and export facilities. This model reduces duplication of investments and lowers entry barriers for project developers. ILF is playing a central role as an advisor to the Ministry of Mineral and Energy Resources, at the behest of the European Bank for Reconstruction and Development.

Common-Use Infrastructure as a Catalyst

The concept of shared infrastructure introduces a cooperative dimension to what is otherwise a competitive market. By centralising certain components of the value chain, it allows:

- Optimisation of capital expenditure
- Reduction in project-specific risk exposure
- Improved land and resource allocation
- Enhanced technical integration across projects

The approach reflects a broader principle: long-term cooperation among stakeholders can yield more efficient outcomes than isolated project development with dominating economy of scale effects for production systems such as electrolyzers and ammonia synthesizers. This is particularly relevant in early-stage markets, where scale and coordination are essential for cost competitiveness.

Typically, the key components of CUI within integrated hydrogen and energy hubs encompass energy transmission, port infrastructure, ammonia storage, and desalination systems. It distinguishes between alternative energy transport pathways, including electricity transmission and hydrogen molecule distribution. The framework also evaluates hub configurations, comparing integrated plots with shared infrastructure models, alongside different electrolyzer deployment strategies. Supporting elements such as export pipelines, storage tanks, and water supply systems are incorporated to ensure end-to-end functionality.

Market Development: Demand and Supply Dynamics

Looking ahead, the maturation of the hydrogen economy will depend on balanced progress across both supply and demand.

Demand-side considerations

- Development of reliable offtake structures that are still a major pain point for most developers
- Emergence of price competitiveness of green (renewable energy-based) variants over grey (fossil fuel-based) ones within defined market ranges
- Increased adoption in sectors such as fertilisers, power generation, and industrial processes for green variants

Supply-side considerations

- Deployment of integrated production value chains built on the principles of common-use
- Expansion of infrastructure based on shared-use principles
- Progressive scaling aligned with market readiness

In parallel, international cooperation will play a key role. Partnerships between MENA countries and importing regions—particularly in Europe and Asia— should be aligned to facilitate financing and technology transfer from economically proficient states in the EU against confirmed long-term offtake arrangements that absorb the pricing uncertainties. This would drastically improve bankability issues the projects face.

Conclusion

Green hydrogen development in MENA is transitioning from rapid expansion to a more structured and pragmatic phase. While initial expectations around rapid scale-up have been moderated, the long-term fundamentals remain robust.

Jordan's experience demonstrates the importance of:

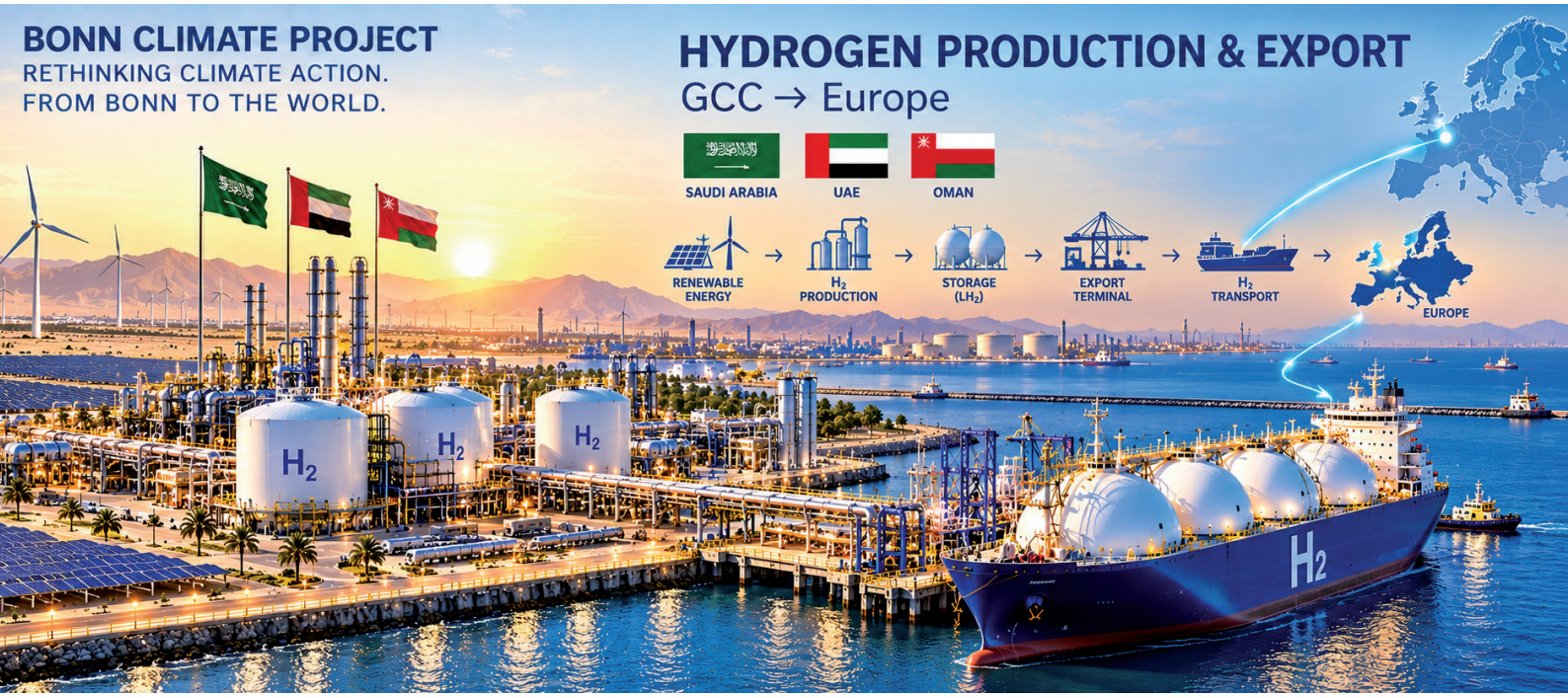
- Linking strategic vision with infrastructure planning
- Promoting shared-use models to enhance efficiency
- Aligning market development with institutional readiness

As global hydrogen markets continue to evolve, the ability to integrate policy, infrastructure, and market signals will determine which regions successfully translate potential into sustainable implementation.



Prateek Banerjee
Senior Management Consultant

ILF Consulting Engineers
Germany



GCC Hydrogen Production & Export © Heinz J. Sturm

Hydrogen Beyond Production: Creating Market Access Between GCC and Europe

Heinz J. Sturm

Global energy disruptions and accelerating climate policy are reshaping international energy markets. For GCC countries and Europe alike, hydrogen is emerging not only as a new energy carrier, but as a strategic instrument for maintaining and restructuring energy trade relations. Its success, however, will depend on the creation of operational market systems.

> "Hydrogen will not become a market without alignment with international climate policy frameworks."

Energy Transition Under Geopolitical and Policy Pressure

The global hydrogen transition is increasingly discussed in terms of production targets and capacity expansion.

However, practical experience from infrastructure development and international climate policy processes suggests a different reality:

- Hydrogen transition is not primarily a production challenge.
- It is an infrastructure integration challenge.

Recent developments in global energy markets have highlighted structural vulnerabilities in traditional oil and gas export systems. Disruptions in transport routes and infrastructure have demonstrated how dependent existing models are on stable geopolitical conditions.

For GCC economies, this does not diminish their strategic importance. Rather, it reinforces a central reality:

Long-term economic stability requires the evolution of export models beyond hydrocarbons.

This implies a structural transition from hydrocarbon-based export systems towards post-oil energy systems, with hydrogen emerging as a central export vector.

Over more than two decades of engagement with GCC countries and the broader MENA region, hydrogen has increasingly been approached not only as a technological option, but as a structural component of economic diversification strategies.

At the same time, global climate policy frameworks are accelerating this transition. Decarbonisation targets, industrial transformation strategies and regulatory mechanisms—particularly in Europe—are fundamentally reshaping energy demand.

Hydrogen at the Intersection of Climate Policy and Trade

Hydrogen is increasingly positioned as a key solution for sectors that cannot be fully electrified, including:

- heavy industry
- long-distance transport
- chemical processes

However, hydrogen is not only a technological solution.

It is becoming a structural element of international energy trade under climate policy conditions.

This creates a new dynamic:

- Europe is developing strong demand driven by decarbonisation policies
- domestic production remains structurally limited
- international supply partnerships are therefore essential

In this context, GCC countries are uniquely positioned to become key suppliers of hydrogen to Europe.

This perspective is increasingly reflected in international climate policy processes, including UNFCCC-related frameworks, where hydrogen is understood as a practical instrument linking decarbonisation objectives with economic transformation and energy system restructuring.

The Real Constraint: Market Formation

Despite rapid progress in hydrogen production projects, a fundamental challenge remains: Markets are not yet operational.

Real Demand / Complete Mobility Fleet © Heinz J. Sturm



This is not a technological gap. It is an implementation gap.

The absence of integrated system architecture—rather than a lack of technology or capital—has been the primary limiting factor in hydrogen market development.

The global hydrogen economy does not suffer from a lack of strategies. On the contrary, numerous roadmaps and policy frameworks exist at national and international levels.

"The central gap lies in turning strategies into operational hydrogen markets–through real applications and demand structures."

Hydrogen becomes economically viable only when it is:

- integrated into real applications
- linked to reliable demand structures
- embedded in operational environments

Without these elements, production capacity cannot be converted into sustainable business models.

Without alignment with international climate policy frameworks, this implementation gap cannot be closed. Investment in hydrogen requires a clearly defined purpose, supported by regulatory structures and long-term policy credibility.

From Concept to Implementation: The Missing Infrastructure Layer

Methodological approaches for hydrogen infrastructure implementation—particularly in developing economies—have already been developed and documented within international climate policy frameworks, including UNFCCC-related processes.

These approaches provide structured pathways for translating hydrogen strategies into deployable infrastructure and market systems under real economic and regulatory conditions.

The transition to implementation therefore requires the systematic development of application-driven projects across multiple sectors. These projects form the basis for both national and international hydrogen deployment and must align with evolving regulatory frameworks, technical standards and climate policy requirements.

In this context, the development of demand-oriented projects becomes a critical prerequisite for enabling functioning hydrogen markets.

To support this process, a new category of infrastructure is required:

HYDRA Next Generation Fleet © Heinz J. Sturm





Bonn–Rhein-Sieg–Rheinland Reference Region © Heinz J. Sturm

Operational Hydrogen Entry Platforms

These platforms provide:

- direct connection between international supply and local demand
- real application environments (mobility, logistics, industry and selected building applications)
- integration of infrastructure, vehicles and industrial processes
- validation under real operating conditions

They are not research environments or conceptual frameworks.

They are implementation platforms for market creation.

Bridging Production and Demand: A Practical Approach

Structured implementation environments of this kind are now beginning to emerge in Europe where operational environments are being developed to facilitate the integration of hydrogen into real market applications.

The underlying principle is clear:

The hydrogen economy requires places of implementation, not only concepts.

Within such environments, all relevant elements are combined:

- infrastructure proximity
- industrial and mobility applications
- operational processes
- stakeholder integration

This enables international partners to:

- test and validate applications
- access real demand structures
- reduce market entry risks
- accelerate commercialisation pathways

Early integration of climate policy, infrastructure design and market development creates a structural advantage in hydrogen deployment.

GCC–Europe Cooperation in a New Phase

The evolving hydrogen economy is redefining the nature of cooperation between GCC countries and Europe.

Future energy relations will increasingly depend on:

- access to downstream markets
- participation in application ecosystems
- integration into operational systems

This marks a transition: from export-oriented models to integrated energy partnerships.

For GCC stakeholders, this implies moving beyond production towards active market participation.

For hydrogen producers and investors, this may also open a new strategic perspective: participation in selected downstream infrastructure and market-development platforms in Europe. Such engagement can help connect future hydrogen supply with infrastructure, applications and reliable demand — and thereby support long-term market access.

Securing supply is one side of the hydrogen economy. Securing access to demand is the other.

For Europe, it implies ensuring supply security through system integration rather than contracts alone.

"This creates a direct opportunity for GCC stakeholders to secure early market access through participation in operational demand environments."

Conclusion: Implementation Will Define Market Success

The transformation of the global energy system is no longer driven by technology alone.

It is shaped by:

- climate policy frameworks
- geopolitical realities
- and the ability to create functioning markets

Hydrogen sits at the centre of this transformation.

However, its success depends on one critical factor:

the establishment of operational structures that enable real market integration.

Without such structures, hydrogen will remain a strategic concept.

With them, it becomes a functional component of global energy trade.

ME-Hub Meckenheim / AI · Data · Digital Twin © Heinz J. Sturm





H2 Landing Storage Distribution © Heinz J. Sturm

Outlook

Current developments suggest that the next phase of the hydrogen economy will be defined by:

- the creation of demand-side ecosystems
- the integration of international supply
- and the establishment of operational entry platforms

This provides the foundation for a more resilient, diversified and climate-aligned energy relationship between GCC countries and Europe.

About the Author

Heinz J. Sturm is a Germany-based Strategic Hydrogen Integration Architect with over 40 years of engineering and entrepreneurial experience and more than two decades of engagement across the GCC and MENA region.

He is the initiator of the Bonn Climate Project – The Case for Hydrogen, an implementation-oriented framework developed to support international climate policy through hydrogen-based infrastructure integration.

His work focuses on aligning hydrogen production, infrastructure and industrial demand within real economic environments, bridging the gap between policy ambition and market deployment.

Selected contributions have been documented and applied within UNFCCC-related frameworks, particularly in the context of economic diversification, response measures and energy system transformation.

Executive Summary

The global hydrogen economy is entering a decisive phase. While production capacities are expanding rapidly—particularly in the GCC region—the primary challenge is no longer supply, but the creation of functioning market structures.

At the same time, international climate policy frameworks are reshaping energy demand, especially in Europe, where hydrogen is expected to play a central role in decarbonising industry, transport and energy systems. However, domestic production alone will not meet this demand, creating a structural dependency on international supply.

This evolving landscape defines a new form of interdependence between GCC countries and Europe:

GCC producers require reliable market access, while Europe depends on stable hydrogen imports.

Despite strong strategic alignment, a critical gap remains:

Hydrogen markets are not yet operational.

The key constraint is not technological, but structural. Hydrogen requires integration into real applications, demand systems and infrastructure environments in order to become commercially viable.

Operational hydrogen entry platforms represent a necessary infrastructure layer to bridge this gap. They enable the connection between international supply and local demand, support application development and reduce market entry risks.

Approaches aligned with international climate policy frameworks—such as those developed within UNFCCC-related contexts—demonstrate that hydrogen market implementation is achievable when policy, infrastructure and demand are structurally integrated.

The next phase of the hydrogen economy will therefore be defined not by production volumes, but by the ability to create operational market systems.

"This requires the active development of demand through real projects and operational market environments."

Signature Statement

"Without alignment with climate policy, there is no investment—and without investment, no hydrogen market."

Implementation Note

The Mobility and Energy Hub Meckenheim Rheinland is being developed as a real-world platform for European hydrogen market integration and as a development platform for the Bonn–Rhein-Sieg–Rhineland reference region in North Rhine-Westphalia.

With a particular focus on connecting international hydrogen supply with European demand structures, the platform combines physical applications with regional infrastructure development, data-based system analysis and project development.

Physical Campus + Digital Regional Development + AI-Supported System Analysis

The platform connects infrastructure, application sectors and stakeholder coordination to enable the development

H2 Landing Port Distribution © Heinz J. Sturm





H2 Hub Germany Landing Storage Distribution © Heinz J. Sturm

of demand-driven projects in key sectors such as mobility, industry and the chemical industry.

It serves as an interface for international hydrogen activities and enables the structuring, bundling and implementation of projects that create tangible demand and facilitate market access.

This approach is based on the understanding that hydrogen markets emerge through the development of application-driven projects that are aligned with international climate policy frameworks and supported by bankable financial structures.

The practical implementation of such structures requires dedicated platforms and partners capable of translating strategic concepts into operational market systems.

The development of functioning hydrogen markets requires capabilities that go beyond strategy and technology.

What is critical is the ability to integrate infrastructure, applications, financing structures and climate policy frameworks into coherent and executable systems.

In this context, the availability of pre-structured projects and implementation-ready concepts represents a decisive advantage, enabling rapid deployment and early market activation.

Project approaches in areas such as mobility, maritime applications and industry are already under preparation and will allow for accelerated implementation once strategic partnerships and suitable investment structures are established—thereby creating the conditions for immediate market entry.

"Without demand, there is no hydrogen market — demand must be actively developed."



Heinz J. Sturm
CEO



Algiers, capital of a country with strong potential for renewable energy. © Sid Ahmed Saoud via Unsplash

Algeria's Energy Transition is Reducing Emissions, Creating New Jobs, and Opening Economic and Political Partnerships Beyond its Borders

GIZ Algeria

Africa's largest country is positioning itself as a major energy hub, combining excellent prospects for renewable energy and green hydrogen with its role as an oil and gas supplier to Europe. GIZ has worked with Algeria since the 1970s, strengthening cooperation on clean energy and economic development, private sector engagement and sustainable value creation.

Algeria is entering an important phase in the development of its energy sector. With exceptional solar resources, a long-established energy industry and a national target of 15,000 MW of renewable-energy capacity by 2035, the country is seeking to translate its natural advantages into lasting economic value. Renewable energy (RE), green hydrogen (GH2), energy efficiency and the digitalisation of the electricity system are all part of this effort, alongside the development of the skills, institutions and industrial capabilities required to support it. Through the GIZ energy portfolio in Algeria, Germany supports this transition working with Algerian partners to strengthen the regulatory, technical and institutional conditions needed to advance these areas.

The country's massive renewable energy potential could not only help diversify its



Renewable energy deployment in Algeria: Photovoltaic and wind power. © GIZ / Fouad Bestandji

energy system, but also strengthen overall energy security

Energy remains central to Algeria's economy. Hydrocarbons account for around 60 per cent of state budget revenues and 95 per cent of exports, while 98 per cent of the country's energy mix is still based on fossil fuels. Diversification is therefore as much a question of energy security, competitiveness, industrial development and employment as it is of climate policy.

Algeria has considerable solar potential, with between 2,000 and 3,900 hours of sunshine each year and daily irradiation levels ranging from 3,000 to 6,000 Wh per square metre. For perspective, this is roughly 1.5 to 2 times the levels typically experienced in Germany. Reaching the target of 15,000 MW of installed renewable-energy capacity by 2035, however, will require much more than the construction of new generation facilities. At this scale, renewable energy could provide electricity equivalent to the annual consumption of millions of Algerian households. Electricity networks, regulation, financing, technical standards and professional skills will all need to keep pace.

The project TaqatHy+ – Technology and Socio-Economic Development for Renewable Energy, Green Hydrogen and Energy Efficiency in Algeria – works within this broader context. Co-financed by Germany, through the Federal Ministry for Economic Cooperation and Development (BMZ), and the European Union (EU), implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, and steered by the Algerian Ministry of Energy and Renewable Energies (MEER), the programme runs from December 2022 to May 2029.

Its activities cover renewable-energy development, green hydrogen, energy efficiency and emissions reduction, with particular attention to the regulatory, technical and economic conditions needed to move renewable and hydrogen projects forward.

Renewable energy: Improving tender conditions and grid integration to achieve the 15,000 MW objective

Expanding renewable energy requires both a credible pipeline of projects and an electricity system able to absorb

additional capacity. TaqatHy+ therefore facilitates the development of large-scale RE projects and helps create the conditions for their successful rollout in Algeria.

Activities include techno-economic modelling, support for renewable-energy regulation, green-electricity certification and electrical interconnection with the EU. The programme also provides technical support for the integration of renewable energy into the electricity grid in cooperation with Sonelgaz, the state-owned electricity and gas utility, complemented by specialised studies, training and the assessment of sites with strong solar and wind potential. This includes socio-economic aspects and the involvement of adjacent population and small-scale support enterprises.

Attention is also given to the regulatory, procedural and economic framework in which investments are prepared. This includes support for photovoltaic tender processes led by the Commission for Electricity and Gas Regulation (CREG), measures to strengthen quality infrastructure and work aimed at increasing the participation of Algerian actors in renewable-energy value chains.

Financing is another important aspect. Cooperation with the banking sector focuses on financial solutions suited to renewable-energy projects. This work is intended to facilitate investment while encouraging greater participation of Algerian companies and professionals in the sector.

Opportunities are opening up for German companies to support this process and establish or deepen their cooperation with Algerian partners. As the Algerian RE market grows, so does demand for expertise and technology across the value chain. Wind energy in particular offers promising opportunities for German engineering and project-development expertise. German companies can also bring solutions for integrating renewables into the electricity grid, for example in the form of grid management, digitalisation, or cybersecurity.

Green hydrogen: A nascent industry with the potential to reshape clean energy supply in Algeria and Europe

Green hydrogen is another important element of Algeria's energy strategy. The country's renewable resources, geographical scale and extensive experience in the energy sector provide favourable conditions for the development of hydrogen production for both domestic use and potential export.

Algeria's national hydrogen strategy, published in March 2023, identifies several priorities. These include diversification of the energy mix, the development of a strategic hub for hydrogen production and export, stronger technological capabilities throughout the value chain, improved energy efficiency and lower emissions.

TaqatHy+ supports the implementation of the national strategy and the development of the regulatory framework for green hydrogen. Its activities include the preparation of an Algerian GH2 atlas to identify suitable production sites, market studies and economic and financial models for potential exports, as well as technical and technological support for Algerian companies working on large-scale hydrogen projects.

Algeria is also positioning itself within emerging European hydrogen initiatives. The SoutH2 Corridor, a planned 3,300-kilometre hydrogen corridor linking Algeria and Tunisia with Italy, Austria and Germany, could provide a pathway for transporting GH2 to European markets, where demand is growing. The Algeria to Europe Hydrogen Alliance (ALTEH2A) involves six companies to strengthen cooperation along the hydrogen value chain.

The development of a green-hydrogen economy could create significant opportunities for both Algerian and German companies across the emerging value chain RE plants, electrolysers, hydrogen storage, transport infrastructure: all of these require technology and service solutions, many of which could be provided by German companies. Equally important, these investments would translate into new skilled jobs and new local supply chains in Algeria. Beyond the activities supported by TaqatHy+, recent commercial partnerships illustrate the growing interest in Algerian-German energy cooperation. First Memorandums of Understanding (MoUs) on GH2 development have been signed, including, for example, between the German technology company BOSCH and Sonatrach in July 2026.

TaqatHy+ looks at potential domestic applications of GH2 and Power-to-X technologies. A digital platform is planned to bring together studies and information on Algeria's national hydrogen potential. This is complemented by specialised training and cooperation between Algerian and European academic and research institutions such as the University of Rostock.

Developing an export market is one part of the equation, but domestic applications, technical expertise and a stronger



A high-voltage transmission tower: Preparing the grid for RE integration. © Jonathan Hanna via Unsplash

knowledge base will be equally important if Algeria is to establish a viable hydrogen industry in the longer run.

Energy efficiency and methane emissions reduction: Making better use of existing resources while reducing flaring and preparing for EU requirements

The energy transition is not solely about developing new sources of supply. Using energy more efficiently and reducing avoidable emissions are critical to Algeria's climate and economic goals.

Within TaqatHy+, work on energy efficiency in public buildings includes advice on regulatory, technical and financial measures, energy audits and support for the preparation of action plans. Pilot measures are used to test approaches in practice, while monitoring, financing mechanisms and training are intended to support their wider application.

The programme also addresses flaring and methane emissions in the oil and gas sector. Activities include inventories of leaks and flaring, the identification of technologies and methods for reducing emissions, comparisons with international practices and standards, and the testing of pilot solutions that may subsequently be applied more broadly.

Since 2024, Algeria has supplied natural gas to Germany, with Sonatrach delivering pipeline gas to VNG and, in 2026, its first LNG cargo to Germany. The 2024 climate strategy of Sonatrach, the state-owned oil and gas company, includes a target of bringing routine flaring below one per cent and reducing methane emissions through leak detection and repair programmes. These efforts are also increasingly relevant for access to European markets, as the EU's 2024 Methane Regulation introduces new requirements for methane emissions. TaqatHy+ supports Algerian institutions and companies in preparing for these requirements and improving the environmental performance of existing operations, which will remain important as hydrocarbons continue to play a central role in the economy. Alignment with the requirements set out in the regulation can help facilitate continued access to EU gas markets, including Germany.

More than that, though, Algeria's changing energy landscape means that conventional gas trade is only part of the story. In June 2026, the German energy company VNG AG and Sonatrach agreed to strengthen their cooperation on natural gas, GH2 and methane emissions, while only a month later Siemens Energy and Sonatrach signed an MoU

covering equipment maintenance and repair, training, GH2 and compression solutions. Such partnerships show the many potential entry points for German companies in co-developing technological solutions with Algeria's energy sector.

Digitalisation/DigiEnR: Preparing the electricity grid for more renewables

As the share of renewable electricity increases, the demands placed on the power system will also change. Variable and increasingly decentralised generation requires better data, more precise planning and greater operational flexibility. Digital tools can play an important role in meeting these requirements.

Around 3,200 MW of solar capacity intended for connection to Algeria's high-voltage network is currently under development. A further 2,500 MW is expected to be integrated into medium- and low-voltage networks. This will place new demands on grid planning, technical standards, data management and the skills of those responsible for operating the electricity system.

The project Digitalisation for the Integration of Renewable Energy, DigiEnR, was established in response to these needs. Commissioned by BMZ and running from December 2025 to November 2028, the project works with the MEER as the political partner and with Sonelgaz and CREG as technical partners.

Its purpose is to strengthen the regulatory, technical and organisational basis for the use of digital solutions in integrating renewable electricity into medium- and low-voltage networks safely and efficiently.

DigiEnR advises the ministry on regulations related to the digital integration of renewable energy and works with Sonelgaz on regulatory, technical and operational recommendations. Public institutions, technology providers and international partners are brought together to exchange expertise on developments in electricity networks, while these topics are also being integrated into Sonelgaz training centres. A mentoring network for women in the electricity sector supports their professional development in a field where women remain under-represented, despite accounting for 60 per cent of university graduates in technical disciplines in Algeria.

The work includes comparing standards and good practices for the digital requirements of grid integration, coaching Sonelgaz experts on the use of data from different sources in network planning, training on data analysis and the development of an information systems security concept. As demand for expertise in these areas grows, the Algerian market may also become more and more interesting to

An academic conference on green hydrogen production at the École Nationale Polytechnique in Algiers. © GIZ / TaqatHy+



German companies working in smart grids, data management, grid planning and information systems security.

New avenues for Algerian-German knowledge cooperation

Algeria's energy transition is creating demand not only for new infrastructure and technologies, but also for specialised knowledge and expertise.

Academic cooperation between German and Algerian universities therefore forms an important part of GIZ Algeria's contribution to the country's energy transition. More than 1,000 participants have engaged in in-person conferences and online lectures. Master's theses and the development of concepts for teaching laboratories have been supported. The capacity development extends beyond universities: engineers, project developers and decision-makers have participated in trainings covering topics such as large-scale photovoltaic project development, GH2 production through water electrolysis, and Green Banking.

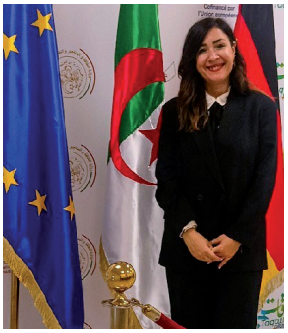
Algeria already possesses many of the resources needed for the next stage of its energy development. The challenge now is to combine those resources with modern infrastructure, technical expertise, research and industrial capacity. Progress across these areas could support a more diversified energy economy in Algeria while laying the ground for long-term cooperation between Algerian, German and European partners. At the strategic level, this cooperation is anchored in the Algerian-German Energy Partnership, which enables joint action on the energy transition.

The Algerian-German Energy Partnership on the path from conventional energy to the energy transition

Launched in 2015, the Algerian-German Energy Partnership has established itself as a strategic platform for dialogue, cooperation and knowledge exchange between Algeria and Germany. It brings together MEER, Sonatrach and Sonelgaz with the Algerian and German private sectors, coordinated in Germany by the Federal Ministry for Economic Affairs and Energy (BMWE). The partnership brings together the responsible Algerian and German ministries as well as key institutions and private-sector actors, including Sonatrach and Sonelgaz. Their cooperation focuses on practical challenges such as expanding RE and integrating it into the electricity grid, improving energy efficiency, developing Algeria's GH2 sector and strengthening the regulatory and technical frameworks needed to support these activities.

The partnership gained further momentum during President Abdelmadjid Tebboune's official visit to Berlin in July 2026. Algeria and Germany adopted a joint declaration setting out a new strategic agenda for bilateral cooperation, with energy transition, renewable energy, green hydrogen and methane emissions reduction among the areas identified for closer cooperation.

Together, these developments illustrate how Algerian-German energy cooperation is evolving from a long-standing relationship in conventional energy towards a broader partnership encompassing renewable energy, green hydrogen, energy efficiency, digitalisation and emissions reduction. Through its programmes in Algeria, GIZ supports this evolving partnership by strengthening institutional capacities, facilitating technical cooperation, and contributing to the regulatory and technical frameworks needed for the energy transition.



Nadya Salama

GIZ Algeria



Elisabeth Gager

GIZ Algeria



Loe Guthmann

GIZ Algeria

»In the German-Arab context, cyber resilience gains strategic importance. The Arab world and Germany are closely linked through energy trade, industrial projects, hydrogen initiatives, LNG infrastructure, renewable energies, technology cooperation, and investments. The more internationally interconnected energy flows, production facilities, and digital platforms become, the more a shared understanding of security becomes essential. Cybersecurity thus becomes a trust factor.«

Christian Uwe Lübker, Managing Director, COSICURA GmbH



Cybersecurity and Critical Infrastructure



Cybersecurity and Cyber Resilience in the Energy Sector

How AI-Based SOCs Protect Critical Infrastructures

COSICURA GmbH

As IT and OT converge, critical infrastructures are increasingly becoming targets of complex AI-powered cyberattacks. Traditional Security Operations Centers quickly reach their limits when faced with a daily flood of alerts. Learn how modern AI-powered SOCs make all the difference—transforming them from reactive defense mechanisms into strategic command centers for true cyber resilience.

Introduction

The geopolitical and technological transformation of the global energy landscape demands a paradigm shift in protecting Critical Infrastructures (CRITIS). As cyber threats grow more sophisticated and AI-driven, traditional security measures are no longer sufficient. For the German-Arab economic partnership, safeguarding energy and gas supply chains is a mutual strategic priority. This article explores how modern, AI-powered Security Operations Centers (SOC) tailored for Operational Technology (OT) bridge the gap between legacy industrial environments and



© Modern Windpark (AI generated)

next-generation cyber resilience, transforming reactive defence into a strategic control center for decision-makers.

The Invisible Frontline of Energy Security

The global energy industry is undergoing a fundamental transformation. Decarbonization, decentralization, and digital transformation are reshaping how electricity, gas, and hydrogen are generated, transported, and distributed. In the course of this evolution, the traditionally isolated worlds of Operational Technology (OT)—the physical control and production facilities—are irreversibly merging with Information Technology (IT). While this convergence generates massive efficiency gains, it simultaneously opens a new, highly vulnerable gateway for cyber actors.

The energy and gas sectors form the backbone of modern economies, both in the Arab states and in Europe. Cyberattacks on energy utilities have long ceased to be a hypothetical threat; they are now part of real-world geopolitical conflict. Attacks on critical infrastructures, such as the one on the Colonial Pipeline in 2021 or on European gas network operators in 2022, demonstrate that cyber resilience is no longer just an IT issue, but a strategic question of survival. But how can complex OT environments be monitored in real time when traditional Security Operations Centers are reaching their limits?

Why Traditional SOCs Are Reaching Their Limits

In reality, many existing control rooms often face a different picture. Security Operations Centers face increasingly complex threats within a challenging environment characterized by alert fatigue, a shortage of skilled personnel, and declining job satisfaction. Every day, thousands of alerts flood in on analysts.



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This creates a nearly unsolved conflict of interest for SOC teams, they either spend valuable time chasing false positives alarms, or they risk overlooking a genuine, critical security breach due to the overwhelming volume of data. Ultimately, this overload compromises the ability to effectively protect organizations. At the same time, cyberattacks are becoming more sophisticated and are increasingly AI-driven. Attackers use artificial intelligence to mutate malware in real time or to perfectly personalize phishing campaigns. A static, overloaded system can no longer keep pace with this speed.

The AI-SOC as a Strategic Control Center

A modern SOC has long been more than just a team analyzing logs. It consolidates security-relevant information, correlates events, and enables informed decisions in near real time. It is the central nervous system of cyber resilience, especially in the energy sector, where disruptions directly impact supply security.

Here, the SOC integrates not only threat intelligence, vulnerability management, and incident response, but also translates technical signals into operationally relevant decisions:

- Which anomaly poses a threat to the gas supply?
- When is intervention required to protect physical processes?
- How can compliance requirements be seamlessly mapped,
  - KSA: Essential Cybersecurity Controls (ECC 2-2024)
  - UAE: National Cyber Security Strategy 2025–2031
  - Qatar: National Cyber Security Strategy 2024
  - EU: NIS-2, KRITIS

A next-generation AI-based SOC leverages modern large language models, advanced natural language processing, machine learning, and automation to analyze security data from diverse, siloed sources. These include:

- Endpoints and assets - continuous state data from servers, HMIs, and engineering stations
- Asset management systems - contextual knowledge of each component's role in the energy flow
- Network Detection and Response (NDR) - real-time monitoring of network traffic for anomalies
- Frameworks and intelligence - integration of standards such as MITRE ATT&CK for OT and current threat intelligence feeds
- Governance - incorporation of internal policies and compliance requirements

AI does not merely aggregate these data streams—it correlates them intelligently. The system understands context and delivers insights in natural language, enabling near real-time comprehension. Analysts are elevated from data collectors to strategic decision-makers.

OT Security Requires Domain-Specific Intelligence

The real advancement lies not in replacing humans, but in closing the gap between data volume and decision-making capability. Analysts, CISOs, or operations managers can query the system in natural language, for example:

„Show me all suspicious login activities by privileged users from unusual locations over the past 48 hours that correlate with OT access or remote maintenance systems."

Instead of an alert flood, the system provides a structured response including affected accounts, asset context, operational risk, and recommended actions.

AI only delivers value in the SOC when combined with OT expertise. Industrial environments differ fundamentally from traditional IT landscapes. Facilities have long lifecycles, proprietary protocols, limited update capabilities, and high

Solarpark © (AI generated)





Cyber Security Operation Center © (AI generated)

availability requirements. Not every anomaly is an attack; not every deviation is harmless. A maintenance technician may access a system legitimately, yet the timing, path, commands, or connection chain may still indicate a risk.

An AI-based SOC for OT must understand industrial context, including asset hierarchies, process criticality, network segmentation, maintenance windows, vendor relationships, and security zones. Only then does AI evolve from a generic analysis tool into an operational security assistant.

Risks can be prioritized before disruptions occur, vulnerabilities assessed based on asset criticality, and management reports can answer the key question: How resilient is the organization against cyberattacks on critical services?

Cybersecurity as a Bridge for German-Arab Energy Partnerships

In the German-Arab context, cyber resilience gains strategic importance. The Arab world and Germany are closely linked through energy trade, industrial projects, hydrogen initiatives, LNG infrastructure, renewable energies, technology cooperation, and investments.

The more internationally interconnected energy flows, production facilities, and digital platforms become, a shared understanding of security becomes essential.

Cybersecurity thus becomes a trust factor. Investors expect strong governance, regulators require demonstrable com-

pliance, operators need operational stability, and international partners demand assurance that joint projects are not jeopardized by digital vulnerabilities. An AI-based SOC establishes a common language, technical detection, risk management, compliance, and business oversight within a transparent operational picture.

The Path to Implementation

The process begins with integrating relevant data sources: OT and IT telemetry, identity data, network communications, vulnerability intelligence, asset inventories, and incident data.

A key requirement is an architecture that does not burden OT systems and prioritizes passive detection.

Next, use cases are defined, such as compromised credentials, unauthorized remote access, unusual IT-OT communication patterns, or suspicious changes to control systems.

AI should be deployed where it delivers clear operational value: alert prioritization, correlation, incident summarization, analyst support, executive reporting, and rapid response.

At the same time, governance is essential: clearly defined roles, explainable decisions, human approval for critical actions, data protection, model oversight, and quality assurance.

Resilience Becomes a Competitive Advantage

In the energy and gas sector, cyberattacks are no longer isolated IT risks—they directly affect supply security, investment protection, and public stability. Organizations that embed cyber resilience strategically do more than protect systems—they safeguard their license to operate.

In this context, the AI-based SOC becomes a foundational pillar of modern cybersecurity. It connects data, people, processes, and technology into a unified operational picture. It enables faster threat detection, better risk prioritization, and clearer decision-making. Above all, it bridges the gap between technical security and business responsibility.

For executives, board members, CIOs, CISOs, and operators of critical infrastructures, the message is clear: cyber resilience is not achieved through isolated tools, but through leadership in the digital domain.



Christian Uwe Lübker
Managing Director

COSICURA GmbH

»As cities across the Middle East and North Africa continue investing in resilient infrastructure, this collaborative approach offers valuable lessons for delivering reliable, efficient, and sustainable water services for future generations.«

Dr. Michael Beckereit, Managing Director, Deutsche Wasser



Water Management



Egypt's New Administrative Capital © Deutsche Wasser

Public-Private Partnership in a Water Utility

Building Resilient Water Services Through Long-Term Collaboration

Deutsche Wasser

New cities are being built in many parts of the world, particularly in the Middle East, Africa, and the Far East. Ghorfa member Deutsche Wasser International has taken over the operation of the water infrastructure (water, wastewater, irrigation) for the New Capital Cairo, Egypt, as a shareholder in ACwater, a company jointly established with the Egyptian government for this purpose. The operation of this vital component of the supply system for the metropolis, planned for 7.5 million inhabitants, with Phase 1 largely completed for 2.5 million residents. The New Capital was already underway in 2025 for the 34 Egyptian government ministries and the first thousands of residents.

Water utilities worldwide are facing a fundamental transformation. Rapid urbanization, climate change, increasing water scarcity, and rising expectations for reliable public services require new approaches to infrastructure management. While engineering excellence remains essential, the long-term success of water infrastructure increasingly depends on operational performance over decades rather than construction alone.

Public-Private Partnerships (PPPs) offer an effective framework for combining public ownership with private operational expertise. When designed as long-term partnerships with clearly defined responsibilities, they can strengthen utility performance while preserving the public interest.

Why Operations Matter

Infrastructure projects are often associated with planning and construction. However, the largest share of value is created during operations and maintenance, which typically account for nearly half of an infrastructure asset's lifecycle costs. This makes operational excellence a decisive factor for service quality, efficiency, and sustainability.

Modern utilities must therefore go beyond maintaining existing assets. They need to reduce water losses, improve energy efficiency, integrate digital technologies, and develop resilient operating models capable of adapting to changing environmental conditions.

The New Generation of PPPs

Traditional PPP models often focused on financing and construction. Today, international infrastructure markets increasingly favor long-term Operations and Maintenance (O&M) partnerships, where public authorities retain ownership while experienced operators contribute management systems, technical know-how, and innovation throughout the asset lifecycle.

A successful utility partnership is built on several principles:

- clear governance structures,
- long-term performance incentives,
- local capacity building,
- technology transfer,
- and shared responsibility for service quality.

These principles become particularly important in rapidly growing metropolitan regions.

Signing Ceremony Arab-German Business Forum Berlin 2025 © Ghorfa / ElSauaf



Water for Egypt's New Administrative Capital: A Practical Example

One of the most ambitious examples of this model is ACwater, the utility operating the Water- and Wastewater Systems of Egypt's New Administrative Capital (NAC) or as called in everyday language, New Capital.

Located approximately 45 kilometers east of Cairo, the NAC represents one of the region's largest urban development projects. The city covers around 950 km² in its first development phase and is designed to serve 2.5 million residents by 2035, with long-term expansion plans reaching 7.5 million inhabitants.

To operate this extensive water infrastructure, a dedicated utility company was established through a long-term PPP structure.

Governance Designed for Long-Term Success

ACwater operates under a 15-year partnership with the Administrative Capital for Urban Development (ACUD).

The shareholding structure combines public leadership with private expertise:

© Deutsche Wasser

ACwater
SMART WATER OPERATIONS

Framework of the partnership


Service Level Contract for the Management, Operation, and Maintenance Services for the Wet Utilities of the New Administrative Capital of Egypt

Between

Administrative Capital for Urban Development (ACUD) S.A.E. (hereinafter the "SERVICE BUYER")

[Administrative Capital Water] S.A.E. (under establishment) (hereinafter the "SERVICE PROVIDER")

DWI Deutsche Wasser International GmbH

Engineering Consultants Group ECG S.A.E.

Cairo, Egypt

In May [ ] 2025

ACwater is the water service company in a long-term partnership (15 years) with ACUD

Shareholding structure:

- **ACUD** (City authority) – 51% | majority, asset owner
- **DWI** (Subsidiary of Tilia) – 41.5% | strategic partner
- **ECG** (Subsidiary of Dorsch) – 7.5% | Egyptian engineering partner

Governance:

Chairman: Ahmed Fahmy (ACUD)

CEO: Christophe Hug (DWI)

Strategic objectives:

- Transfer **German best practices** in utility management
- Deploy **smart water systems**: central SCADA, smart leak detection
- Ensure **efficient resource management**, including re-use of treated wastewater for irrigation and energy-neutral wastewater treatment plants

- 51% ACUD – public majority ownership and asset stewardship
- 41.5% Deutsche Wasser International (DWI) – strategic operations partner
- 7.5% ECG - Egyptian Engineering Partner

This governance model preserves public control while enabling international operational expertise and local engineering capabilities to work together.

Designing Infrastructure for Efficient Operations

The partnership demonstrates that sustainable performance begins with infrastructure designed for operational efficiency.

Approximately 70% of the drinking water network operates through gravity-fed pipelines, reducing pumping requirements and electricity consumption.

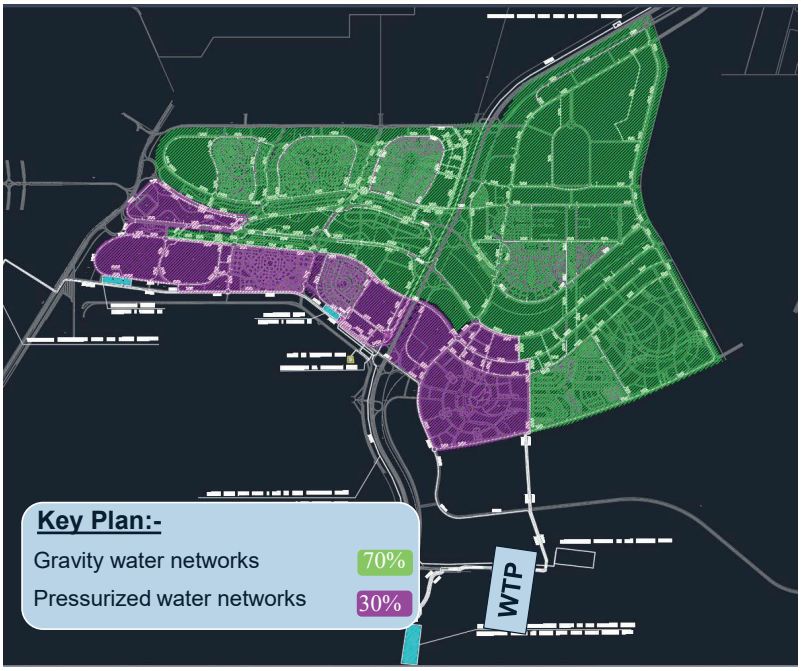
Likewise, the first-phase wastewater network was planned with 100% gravity flow toward the treatment plant, significantly lowering long-term energy demand.

The raw water supply itself reflects this integrated planning approach: three large parallel transmission pipelines, approximately 50 kilometers long, transport up to 1.5 million cubic meters of water per day from the Nile system to the city's treatment facilities.

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ACwater
SMART WATER OPERATIONS

Water Network in the New Capital



Nearly **70%** of water networks in the first phase of NAC is **under gravity** pipelines **to reduce the usage of pumps and electricity.**

WTP will be at the **highest point in NAC at 443** M.S.L to serve the majority of NAC with water by gravity pipelines.

7

From Infrastructure to Smart Utility Management

The operational concept extends beyond conventional utility management.

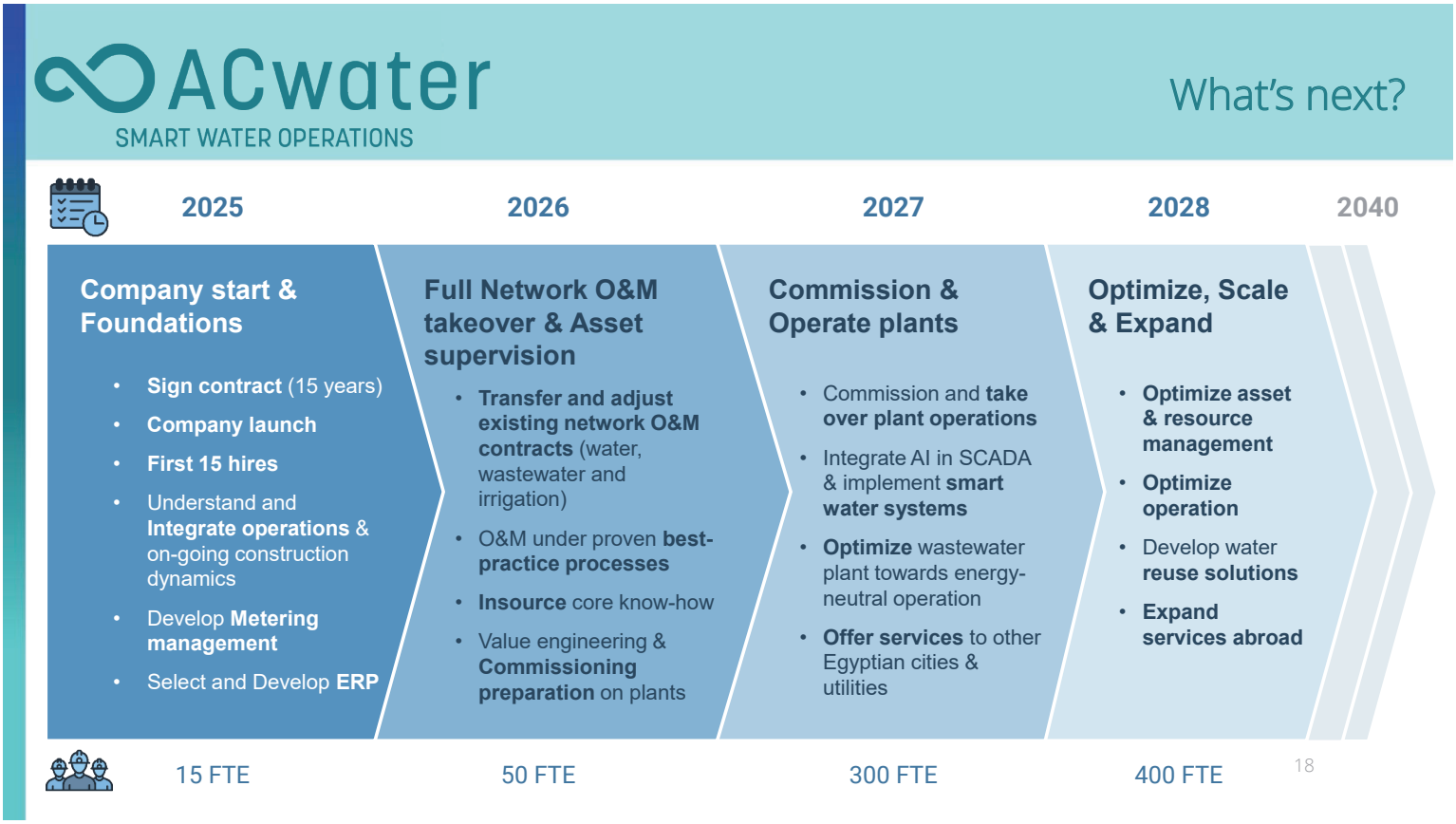
ACwater integrates digital technologies, including centralized SCADA systems, smart leak detection, and digital network management. At the same time, treated wastewater is reused for irrigation, supporting urban green infrastructure while conserving freshwater resources.

A Model for Sustainable Water Partnerships

Global water management is entering an era where historical assumptions about water availability no longer provide reliable guidance. Climate change increases uncertainty, making resilience, adaptability, and long-term governance essential elements of future water strategies.

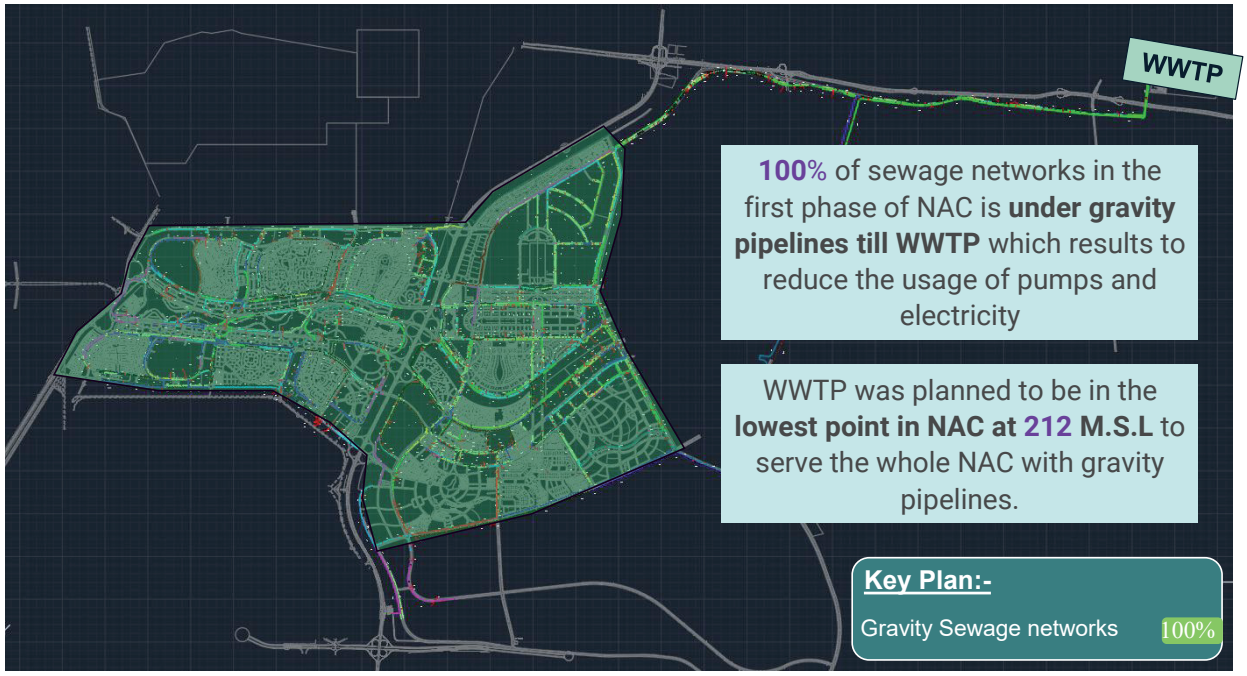
Public-Private Partnerships cannot solve these challenges alone. However, when structured around shared accountability, local partnerships, and operational excellence, they become powerful instruments for improving utility performance.

© Deutsche Wasser



ACwater
SMART WATER OPERATIONS

Sewer Networks in the New Capital



© Deutsche Wasser

The ACwater experience demonstrates how public institutions, international operators, and local engineering partners can jointly create a utility model that combines public stewardship with operational innovation. As cities across the Middle East and North Africa continue investing in resilient infrastructure, this collaborative approach offers valuable lessons for delivering reliable, efficient, and sustainable water services for future generations.



Dr. Michael Beckereit
Managing Director

Deutsche Wasser



© WILO

Stargate UAE: Supporting the Infrastructure Behind Artificial Intelligence

Delivering integrated pumping solutions for the first phase of one of the UAE's largest AI infrastructure developments.

Wilo Middle East

Wilo is a pioneer in sustainable and intelligent premium water solutions for global challenges – creating impact for everyone. Our actions are guided by Wilo's Group Strategy and its core impact areas: Creating, Caring, Connecting. Around 9,000 employees worldwide work every day on innovations with a clear goal: to improve people's quality of life. In building services, water management and industry, we move, treat and control the most important resource on our planet. For over 150 years, we have been thinking ahead – and today, as an innovation leader in our industry, we are shaping the digital and AI era.

The infrastructure behind artificial intelligence

AI is driving unprecedented demand for high-performance computing, accelerating investment in data centres capable of supporting increasingly complex workloads. While processing power often takes centre stage, the performance of

these facilities depends just as much on the engineering systems that operate behind the scenes.

Stargate UAE, currently under development in Abu Dhabi, represents a significant investment in AI infrastructure. The first 200 MW phase is expected to become operational in 2026, forming part of a larger development designed to support the region's growing AI ecosystem.

Reliable mechanical services including water distribution, HVAC systems and utility infrastructure are fundamental to maintaining continuous operation in environments where downtime is not an option.

Building the foundation for AI infrastructure

Modern AI data centres require a wide range of pumping applications extending well beyond chilled water systems. Domestic water supply, pressure boosting, hot water circulation, water transfer, drainage, sewage handling and adiabatic systems all play important roles in supporting daily operations.

For the first phase of the Stargate UAE project, Wilo Middle East supplied pumping solutions across these applications, delivering an integrated package that supports the facility's broader mechanical infrastructure rather than a single system.

Providing a coordinated solution across multiple services helps simplify project execution while ensuring consistent performance, energy efficiency and long-term reliability throughout the facility.

Cooling Data Center Product in Application Product © WILO



Engineering for continuous operation

Unlike many commercial buildings, hyperscale data centres operate around the clock with extremely limited tolerance for interruption. Every mechanical system must therefore be designed with reliability, maintainability and operational resilience in mind.

Pump selection extends beyond hydraulic performance alone. Energy efficiency, redundancy, intelligent controls, digital monitoring and lifecycle costs all influence the long-term performance of the facility.

Variable-speed technologies and intelligent control systems enable pumping equipment to respond to changing operational demands, helping optimise energy consumption while maintaining stable operating conditions across multiple building services.

Regional engineering capabilities supporting global technologies

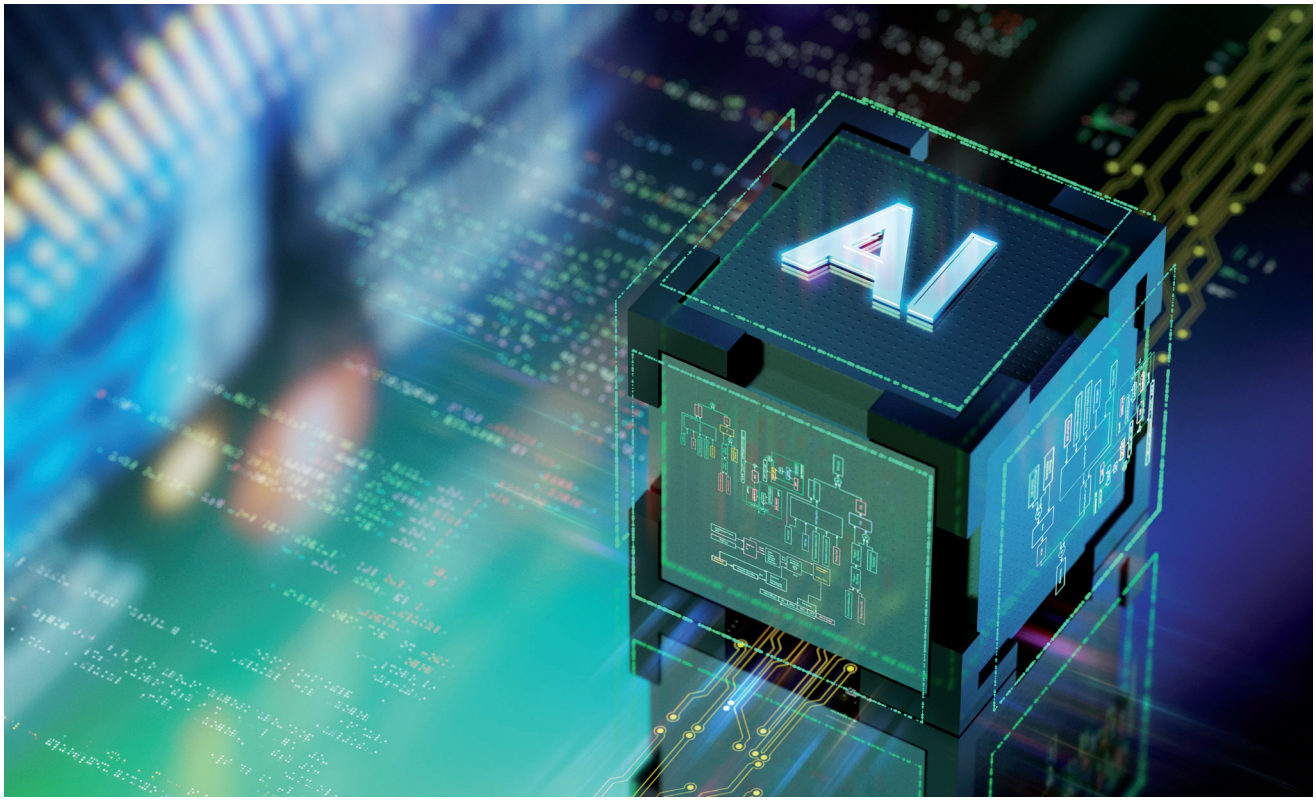
An important aspect of the project is the utilization of regional manufacturing, engineering, and technical expertise.

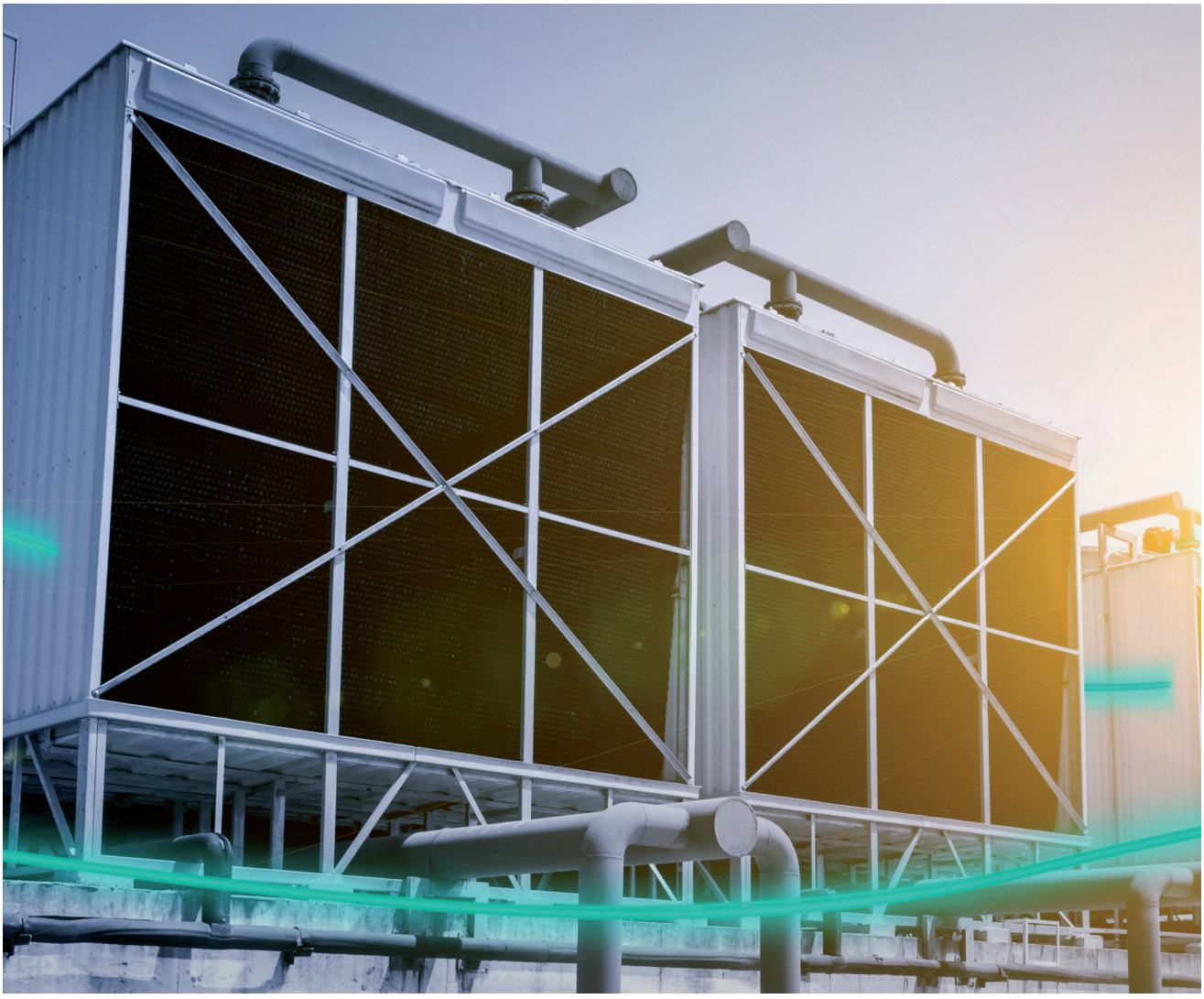
Engineering support, project coordination, testing, and after-sales services are delivered through the regional operations in Dubai, enabling close collaboration with contractors, consultants, and project stakeholders throughout every stage of execution.

Local manufacturing and assembly capabilities also contribute to improved project flexibility by reducing delivery times, facilitating technical customization, and providing responsive support whenever required during installation and commissioning.

This regional presence allows international engineering standards to be combined with localized execution, an increasingly important factor for large-scale infrastructure developments across the Middle East.

GO Data Center © WILO





Data Center Overview Aerial View © WILO

Engineering the systems behind AI

The rapid growth of artificial intelligence depends not only on advances in computing technology but also on the engineering systems that enable these facilities to operate every hour of every day.

By supplying pumping solutions across multiple building services for the first 200 MW phase of the Stargate UAE project, Wilo Middle East is contributing to the mechanical infrastructure that supports reliable, efficient and resilient AI data centre operations.



Sourosh Kiasat
Head of Building Services MENA

Wilo Middle East



Al Galala SWRO © AI

Planning Desalination for a Water-Stressed Future

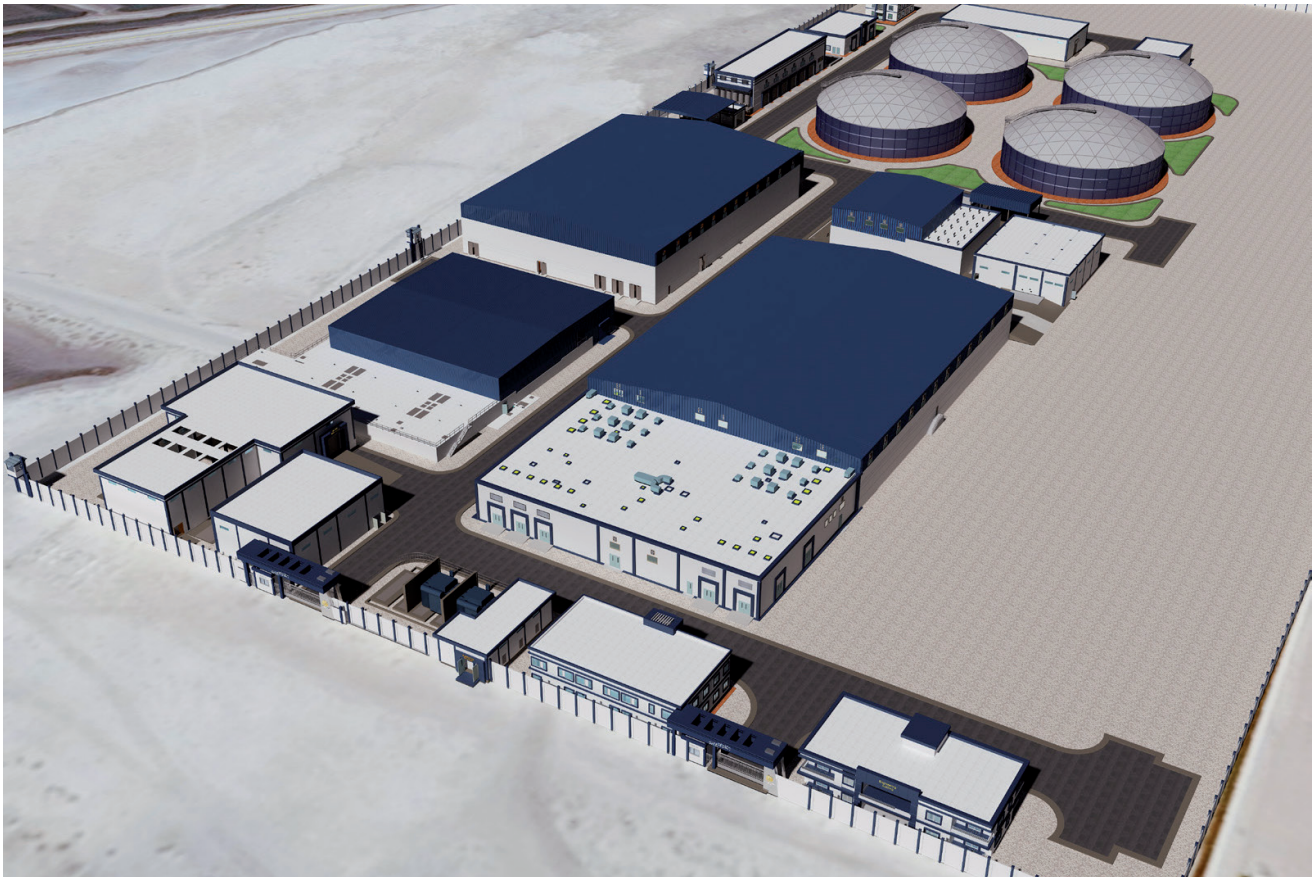
Dorsch Global

The United Nations (UN) estimates that, by 2050, 40% of the world's population will live under severe water stress[1]. In this context, seawater desalination as an alternative water source is gaining increasing relevance. Producing drinking-quality water is only one part of the task; long-term value depends on early integrated decisions across energy demand, concentrate management, and environmental compliance. Dorsch Global supports these planning decisions across the project lifecycle.

More than 150 countries desalinate seawater to provide drinking water to over 300 million people[2]. In 2022, more than 21,000 seawater desalination plants were in operation worldwide, almost twice as many as in 2012, and the sector's capacity is growing at between +6% and +12% per year[3]. By 2030, desalination capacity in Middle Eastern countries is expected to be almost twice that of 2012[4].

"Seawater desalination can contribute to a diversified water supply, but its long-term value depends on integrated infrastructure planning, energy considerations, and environmental performance from the very beginning," says Hossam Korraa, COO of Dorsch MEAA and Member of the Dorsch Global Executive Committee.

1) United Nations, World Water Development Report 2024: Water for Prosperity and Peace (PDF), UN-Water, 2024
2) Salinas-Rodríguez, Sergio, and others (2021). Introduction to desalination, Seawater Reverse Osmosis Desalination: Assessment and pretreatment of fouling and scaling, IWA Publications;
3) Marc-Antoine EYL-MAZZEGA, Élise CASSIGNOL, "The Geopolitics of Seawater Desalination", Studies, Ifri, 27 September 2022;
4) (ibid.)



East Port Said SWRO Desalination Plant – 3D Layout: Detailed aerial view of the plant showing the arrangement of major process, utility, and support facilities within the site. The layout brings together the main treatment buildings, product water infrastructure, storage facilities, and operational buildings, with the site planned to support a desalination capacity of 150,000 m³/day, expandable to 250,000 m³/day. © ECG; Dorsch Global

In this technical contribution, Dr. Mustafa Najah Abdul Jaleel Abo Jabal highlights why effective desalination planning requires integrated decisions across intake, pretreatment, energy, and environmental performance. As Deputy Head of the Water Treatment Department at ECG Engineering Consultants Group, a Dorsch Global company, he has 14 years of experience in desalination engineering and delivery of complex infrastructure projects in Egypt, the Middle East, and Africa.

Why seawater desalination belongs in the overall water mix

Seawater desalination is increasingly discussed as a strategic response to water scarcity and can provide an additional source in coastal and water-stressed regions. It is integral to a broader utility approach, alongside demand management, network efficiency, storage optimisation, and sustainable management of groundwater and surface-water resources.

Crucially, planning must address environmental risks beyond water quantity, especially concentrate (brine) management and discharge effects, intake impacts on marine ecosystems, and the energy-related emissions profile of the entire system. Early integration of environmental assessment and mitigation into design and permitting helps ensure compliance while delivering long-term supply value.

Intake and pretreatment as operational foundations

The intake concept determines operational stability. Raw-water characteristics and seasonal variations drive fouling risk, influencing the pretreatment design. Environmental requirements also affect technical choices and permitting, where seemingly minor details can quickly translate into schedule, cost and delivery risks.

For large projects, robust open-water intake design is key to safe operation and maintenance while managing sediments, scaling and biofouling. Reliability depends on the interaction between intake hydraulics, pretreatment performance, and the capacity of the downstream reverse osmosis (RO) plants.



Al Arish SWRO Desalination Plant – 3D Layout: Three-dimensional representation of the plant site showing the arrangement of main process units and auxiliary facilities. The layout supports efficient process flow, operation and maintenance, while allowing space and interfaces for future expansion. © ECG; Dorsch Global

Choosing the right process configuration

A desalination plant is a system, not a single component. Process selection and system configuration determine energy demand, operational flexibility, and long-term operating costs. For decision-makers, early choices determine both operating costs and resilience under changing conditions. Energy-efficient plants, optimised hydraulic design, and a consistent measurement and control concept support stable operation.

Integrating product water into the supply network

Good planning ensures reliable delivery of treated water under operational constraints, including maintenance windows and demand fluctuations. This reinforces desalination as an integrated, resilience-oriented element of the supply network, not merely a production asset.

Plan flexibility, energy and environmental requirements from the start

Long-term security requires designing expansion pathways and operational flexibility. Energy and environmental factors are decisive planning parameters: desalination is energy-intensive and generates a concentrated brine stream, impacting design choices, permitting feasibility and lifecycle costs. Lifecycle assessment of process configuration, efficiency and energy recovery should start in the concept phase. Brine management must be site-specific, with discharge control and environmental modelling aligned to local conditions, consistent with UNEP guidance. The UN World Water Development Report 2024 reinforces that energy must be central to early decision preparation[5].

5) United Nations, World Water Development Report 2024: Water for Prosperity and Peace (PDF), UNESCO Deutsche UNESCO-Kommission.



Al Arish SWRO Desalination Plant – Commissioning: Completed commissioning-stage facility showing successful design implementation and integration of major treatment units. © ECG; Dorsch Global

Compliance with legal requirements as part of technical planning

Environmental permits and regulatory compliance must be integrated from the outset, covering intake design, chemical handling, concentrate discharge, and the permitting pathway. For business decision-makers, early compliance alignment reduces schedule risk and avoids late planning changes. This improves concept-to-completion predictability, supporting safe operations consistent with regulatory requirements, and long-term sustainability.

From design decisions to delivery outcomes

ECG project experience shows that desalination planning becomes operational reliability through integrated design decisions. Across selected SWRO (Seawater Reverse Osmosis) and other RO projects, early choices on intake and pretreatment, system interface engineering, energy planning, and execution control determine whether the facility delivers stable performance.

Integrated design at mega-scale: Gabal Al Galalah, Egypt

On a mega-scale, reliability is less about a single technology and more about how the entire asset performs under real constraints. At Gabal Al Galalah, ECG supported pre-tender services and detailed design for a 150,000 m^3/day SWRO facility with a 375,000 m^3/day intake. The engineering scope covered civil and structural works, MEP, piping, instrumentation and control, and supporting site infrastructure. For large plants, interfaces are the delivery risk: intake hydraulics, pretreatment protection, product water storage and pumping, chemical dosing, and control logic must be designed to operate together, so the facility can deliver predictable output rather than recovering from avoidable design mismatches.



Al Galala SWRO Desalination Plant – aerial view: Main treatment facilities against challenging mountainous terrain with steep elevation differences, managed through earthworks, retaining structures, and coordinated hydraulic and structural design. © ECG; Dorsch Global

Scalability through phased thinking: Al Arish, Egypt

In water programmes, scalability is both a business issue, and a technical matter. The Al Arish desalination plant is designed for 100,000 m^3/day, expandable to 300,000 m^3/day, with ECG involved in preliminary and detailed design. Such scalability must be planned: not only reserving space but aligning the infrastructure concept with future train additions and the associated interfaces. When process, energy, storage, pumping and transmission connections are considered as one system, expansion becomes a controlled step forward rather than a disruptive redesign.

Intake and pretreatment coherence: East Port Said, Egypt

Desalination reliability often depends on what happens upstream of the membrane. East Port Said illustrates this through the coherence of intake and pretreatment. ECG supported detailed design for a 150,000 m^3/day plant, expandable to 250,000 m^3/day, with a documented process chain including dissolved air flotation, ultrafiltration, and RO. From a business perspective, pretreatment protects operational continuity: when intake conditions and pretreatment performance are engineered as linked components, the plant is better positioned to maintain performance under variability, manage maintenance obligations within lifecycle expectations, and reduce the risk of downstream process interruptions.

From design intent to delivery control: New Mansoura, Egypt

A strong design is not enough: execution control is essential. In New Mansoura, ECG supported design review and construction supervision for a RO plant with Phase 1 production of 40,000 m^3/day and 80,000 m^3/day intake capacity. This instance shows why design governance matters: construction supervision and technical review support alignment between engineering specifications and field conditions, preserving performance assumptions through



East Port Said SWRO Desalination Plant – 3D Overall Site Layout: Wider aerial perspective illustrating the scale and integrated planning of the desalination complex, with the main treatment facilities, large product water tanks, utilities, and supporting buildings organised across the site. The arrangement reflects the plant's mega-scale capacity and the coordination required between its treatment, storage, pumping, and operational facilities. © ECG; Dorsch Global

installation and commissioning. The outcome is clearer interfaces at handover, fewer deviations, and a more reliable path from concept to operations.

The decisions that matter most are made early

In each case, focus aligns with a reliability driver: system design at mega-scale, scalability through phased concept decisions, performance protection via intake, pretreatment coherence, and design-intent preservation through execution control.

Conclusion: what integrated planning delivers

Desalination delivers value for water security when designed as an integrated infrastructure system. Critical early decisions define the design basis, connect interfaces end to end, and translate energy, concentrate management and compliance into buildable and operable solutions. For decision-makers, long-term reliability depends not on a membrane process alone, but on intake–pretreatment coherence, energy and network integration planning, and governance that carries design intent through delivery to commissioning.



Dr. Mustafa Abo Jabal
Deputy Head of the Water Treatment Department

ECG Engineering Consultants Group

BUILDING BRIDGES BETWEEN GERMANY AND THE ARAB WORLD



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About us

The Ghorfa Arab-German Chamber of Commerce and Industry is the competence centre for innovative match making and business relations between Germany and the Arab world. For 50 years, we have been successfully promoting business cooperation between German and Arab companies. We support German and Arab companies in the development and expansion of their respective business.

Our network

The Ghorfa pursues non-profit goals to enhance and strengthen business relations between Germany and the Arab world in the fields of trade, industry, finance, and investment. Strategic partnerships, based on mutual benefit and understanding, create new business opportunities that facilitate benefits for both sides. These partnerships are facilitated by the Ghorfa's close connection to German and Arab institutional and entrepreneurial decision-makers. This well-established network will help member companies find the right business opportunities and partners.





What we want

At Ghorfa, we strive to achieve our ideal objectives by focusing on three central pillars - networking, information, and consulting. Our aim is to bring Arab and German business partners together, provide them with current business opportunities and market developments, and foster long-term relationships through regular meetings, vibrant dialogue, and comprehensive reporting on the latest developments in both regions. Our ultimate goal and driving force is to facilitate strong and sustainable partnerships.

What we do

Our core tasks are in the areas of networking, information, and consulting. We promote cross-sector cooperation between the business communities in the Federal Republic of Germany and the Arab countries in the areas of trade, industry, finance, investments, economic development, and intercultural exchange. With top-class events, delegation trips, intercultural seminars, informative publications and current reports from the Arab world and Germany, we create the best possible framework conditions for our member companies for their business activities in Germany and the Arab countries.





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Project: Cybersecurity and Cyber Resilience in the Energy Sector

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Deutsche Wasser International

At Deutsche Wasser International, we manage and operate water infrastructure internationally. From treatment facilities to distribution networks, our mission is to deliver clean water, reliably and sustainably. With a focus on long-term stewardship, innovation, and regulatory compliance, we ensure that water remains a resilient and accessible resource for communities and industries.

Project: Public-Private Partnership in a Water Utility

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Dorsch Global

Dorsch Global is an international planning and consulting company with a team of over 7,500 employees active in more than 60 countries. Our fields of expertise span Architecture & Buildings, Water, Energy, Mobility, Urbanisation, and Environment & Society. With over 75 years of experience, our teams around the world combine local knowledge with global expertise – identifying emerging trends, leveraging international synergies, and consistently delivering excellent outcomes for our clients across all project life cycles. Our interdisciplinary teams work across more than 12,000 projects worldwide, shaping a future worth living in.

Project: Planning Desalination for a Water-Stressed Future

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Project: Hydrogen Beyond Production: Creating Market Access Between GCC and Europe

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Project: Green Hydrogen Development in MENA: From Ambition to Implementation – Insights from Jordan

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Project: Stargate UAE: Supporting the Infrastructure Behind Artificial Intelligence

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Partnerships and Perspectives of Arab-German Cooperation

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