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Issue 3

SIG launches 2-megawatt solar power plant in Saudi Arabia partnering with Yellow Door Energy p.24

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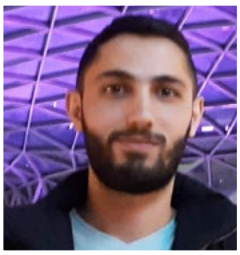
Latest Developments Shaping the Energy Sector



The global energy landscape is undergoing rapid transformation, driven by technological innovation and heightened climate ambitions. In industrial solar expansion, advancements in photovoltaic (PV) cell efficiency and cost reductions are accelerating adoption. Next-generation solar panels, including perovskite-based designs and bifacial modules, now offer higher energy yields even in low-light conditions. These improvements, paired with streamlined manufacturing processes, have made rooftop solar installations increasingly viable for industrial facilities, reducing reliance on grid electricity while cutting operational costs.

Beyond solar, the renewable energy sector is diversifying. Floating offshore wind farms, deployed in deeper waters, are gaining traction as they bypass space constraints and harness stronger wind resources. Simultaneously, green hydrogen production—powered by renewables—is emerging as a critical solution for decarbonizing heavy industries like steel and shipping. In the U.S., wind energy capacity is projected to reach 153.8 GW by the end of 2024, supported by federal incentives and corporate power purchase agreements.

Globally, India's commitment to achieving 50% renewable electricity by 2030 and net-zero emissions by 2070 underscores the shifting priorities of major economies. However, the pace of energy transition varies across sectors. While the power sector leads in renewable integration, heat and transportation lag due to infrastructure and scalability challenges.

In 2025, energy efficiency remains a focal point for international organizations like the International Energy Agency (IEA) and World Economic Forum (WEF), which are pushing for stricter industrial standards and smart grid technologies. Concurrently, advancements in energy storage and small modular reactors (SMRs) aim to address intermittency issues and bolster grid resilience.

Despite progress, the renewables sector faces headwinds. Supply chain bottlenecks and rising demand for critical minerals threaten to slow deployment, while policy inconsistencies across regions create uncertainty. As industries navigate these complexities, collaboration between governments, technology providers, and investors will be pivotal in scaling innovations and meeting climate targets.

The year ahead promises both opportunities and challenges, with technology acting as a catalyst for sustainable growth. From industrial solar breakthroughs to cross-sector decarbonization strategies, the energy industry is poised to redefine global economic and environmental trajectories.

In This Issue!

energyHQ's March 2025 issue covers the most recent developments and events pertaining to the energy industry, as well as including valuable insights, details and spec sheets / peer reviews related to latest technologies, innovations, products, services, and projects of relevance to the industry and its audience.

- Article on page 7 talks about Geothermal & Hydropower Innovations
- Article on page 16 focuses on Nuclear's Role Climate Mitigation
- Article on page 24 sheds the light on Industrial Solar Expansion

Additional content is also available covering the latest activities of manufacturers, importers, and exporters – worldwide!

We hope you benefit from this issue's content and find it useful & actionable for your business. For any comments, suggestions, or feedback please don't hesitate to contact me.

Best wishes,
Hassan Mourtada
Editor-in-Chief
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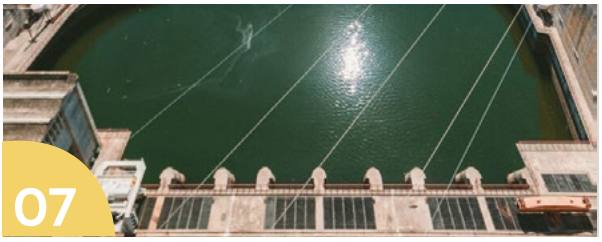
Introduction



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World Digest

Saudi Arabia

Siemens Energy secures $1.6bn power project deal in Saudi Arabia

Located in the western and central regions, the plants will contribute 3.6GW of power to the national grid.

Siemens Energy has secured a $1.6bn project to supply essential technologies for the Rumah 2 and Nairyah 2 gas-powered power stations in Saudi Arabia.

Situated in the western and central regions, the plants will contribute 3.6GW of power to the national grid, enough to supply 1.5 million homes.

Harbin Electric International is acting as the engineering, procurement and construction contractor for the project, which encompasses extended maintenance agreements to uphold the plants' operational reliability up to 2049.

Key components for the power plants will be produced at the Siemens Energy Dammam hub, which is currently undergoing expansion to boost local production capacity and support Saudi Arabia's energy sector.

Rumah 2 and Nairyah 2 will be among the largest combined-cycle power stations worldwide, replacing old oil-powered plants and lowering CO_2 emissions by as much as 60% in comparison to traditional oil-driven electricity generation.

The power plants have been designed to accommodate advanced CO_2 capture and storage technologies, supporting Saudi Arabia's long-term emission reduction targets.

They will connect to the grid in simple cycle mode in 2027, transitioning to full combined-cycle operation the following year.

France

France: Solar energy professionals oppose the reduction of subsidies for photovoltaic installations

The government's decision to refocus support on 100 to 500 kWc photovoltaic installations is drawing strong reactions from industry players. Trade unions and federations denounce a sudden challenge to the economic model of rooftop and canopy installations.

The French government has announced a revision of subsidies granted to small and medium-sized solar projects. This shift aims to adjust the economic framework of the 100-500 kWc segment, which has seen strong growth in recent years, while keeping public spending under control. However, industry professionals believe this measure could halt many projects and threaten specialized businesses.

An economic moratorium under fire

According to the Syndicat des énergies renouvelables (SER) and Enerplan, the government's decision effectively imposes a moratorium on photovoltaic projects under 500 kWc. The support framework is set to be modified retroactively from February 1, 2025, rendering these installations economically unviable. This measure particularly affects installations on commercial, industrial, and agricultural rooftops, as well as parking lot canopies.

Industry representatives urge the government to maintain the current tariff framework until a new support mechanism is implemented, though no timeline has been provided. "The momentum of the S21 segment is being abruptly cut short. This sudden halt is unacceptable," said Daniel Bour, president of Enerplan.

China

How China came to dominate the world in renewable energy

China now eclipses every other country in the world — including the United States — in the green technologies of the future. Here's how it achieved this lead.

China's takeover of nearly every technology needed for the green energy revolution happened gradually — then all at once.

China now eclipses every other country when it comes to installations of wind and solar power, a striking transformation from 15 years ago. It was fueled by a gold rush of entrepreneurship and unwavering government support, including through hundreds of billions of dollars in subsidies.

In the race to master technologies of the future, green energy is one arena where many analysts agree that China has pulled ahead of the United States in almost every key area, from electric vehicles to solar panels.

That gap is likely to widen under President Donald Trump, analysts say. As Trump focuses on boosting fossil fuel production and cutting funding for clean energy projects, China is further increasing investment in renewable energy technologies.

"It is difficult to overstate China's singular lead across clean energy technologies. The gaps are both enormous and historically unprecedented," said Milo McBride, fellow at the Carnegie Endowment for International Peace, a think tank.

Egypt

Egyptian Space Agency, Tanmia Petroleum partner to enhance safety in energy sector

The Egyptian Space Agency (EGSA) and Tanmia Petroleum Company have signed a Memorandum of Understanding (MoU) to leverage space applications for developing advanced monitoring and early warning systems for petroleum and mineral resources facilities.

The agreement was signed at EGSA's headquarters by Sherif Sedky, CEO of the agency, and Mostafa Amer, chairperson and managing director of Tanmia Petroleum.

EGSA, an economic public authority specializing in the development, transfer, and localization of space science and technology, plays a pivotal role in supporting key sectors in Egypt through its expertise in satellite data analysis. Tanmia Petroleum, a leading national company providing aerial technical support to the petroleum sector, aims to enhance safety and security measures across oil, gas, and mineral facilities through this collaboration.

Under the terms of the MoU, both entities will work together to develop innovative technological solutions that optimize operations in the petroleum and mineral resources sector. This includes utilizing remote sensing technology to detect potential leaks in production lines, creating smart systems for the early detection of theft attempts targeting production infrastructure, and monitoring mines under the Mineral Resources Authority to identify leaks or unauthorized activities.

Sedky emphasized that this partnership represents a major step toward harnessing space technology to support Egypt's economic development.

Argentina

Argentina oil and gas production and exports

The development of Vaca Muerta oil reserves, one of the largest shale gas and oil deposits in the world, combined with production incentives, tax exemptions, labor concessions, and other supportive government policies, is adding significant value to the country's trade balance, and is expected to further boost the domestic economy in the medium term.

Argentina's mining and energy sector represents 4% of the country's economy (in gross domestic product terms), while crude oil and natural gas extraction and related activities alone stand out with gross value added of US$20. Billion, representing 3.4% of GDP.2 The Argentinian economy depends quite heavily on its agricultural, oil and gas, and mining sectors—which together represent almost 70% of Argentina's exports.

This trend is expected to continue, especially due to growth in at least two of those three sectors. During 2024, Argentina's exports reached a total amount of US$79.7 billion, with oil and gas contributing US$8.53 billion, or 11% of the total, according to the National Institute of Statistics and Census of Argentina.

In the last decade, however, the sector experienced a phase of negative trade balance due to low investments and trade controls that weighed heavily on local production—a trend that changed in 2024.

Philippines

Philippines' Renewable Energy Boom Faces Battery Storage Bottleneck

As the Philippine renewable energy sector continues to expand, the lack of battery storage systems may become a significant bottleneck in integrating clean power sources into the grid, an industry executive has warned.

Eric Francia, President and CEO of ACEN Corp., highlighted concerns over the country's ability to absorb increasing renewable energy capacity, particularly from solar photovoltaic systems, without sufficient battery storage solutions.

Grid Capacity and Storage Challenges

The Department of Energy (DOE) is preparing for the fourth wave of its Green Energy Auction Program, which aims to integrate renewable energy facilities with storage technologies. However, Francia emphasized that standalone battery storage systems are still necessary to ensure grid stability and manage fluctuating power supply from renewables.

Investors remain cautious due to concerns over the economic viability of battery energy storage systems (BESS), given the lack of price volatility in the local energy market.

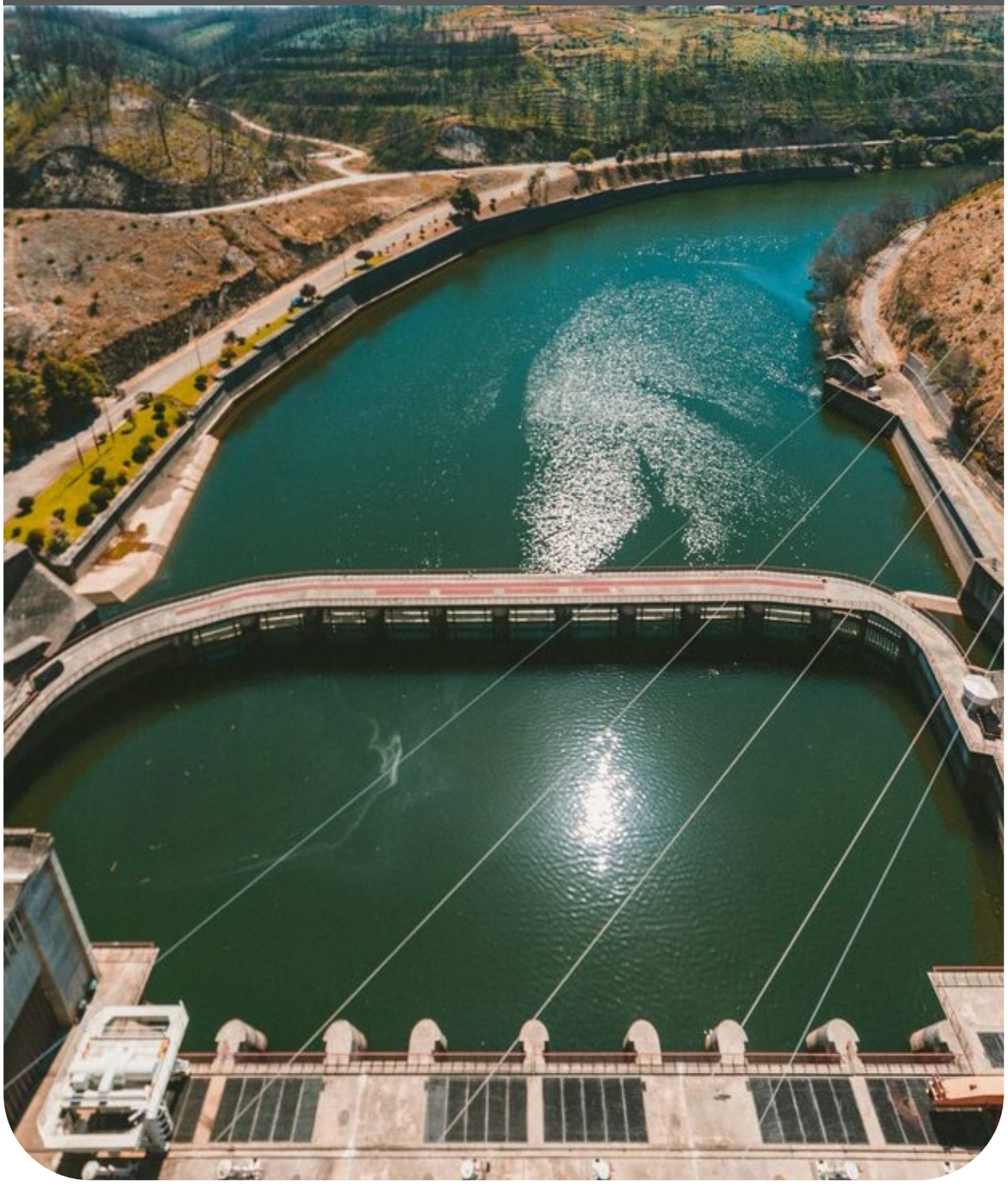
The Role of Battery Energy Storage

BESS technology allows power producers to store excess electricity generated from renewable sources for later use, helping mitigate the intermittent nature of solar and wind power.

Francia noted that the cost of battery storage has significantly declined, from $1 million per megawatt-hour five years ago to approximately $200,000 per megawatt-hour today.

Renewable Energy

07 Geothermal & Hydropower Innovations



Geothermal and Hydropower Innovations: Pioneering the Future of Renewable Energy

The global energy sector is undergoing a transformative shift as nations strive to meet decarbonization targets and enhance energy security. Among renewable energy sources, geothermal and hydropower stand out for their reliability and scalability. Recent advancements in technology are now unlocking unprecedented potential in these sectors, positioning them as cornerstones of the clean energy transition. This article explores cutting-edge innovations driving progress in geothermal and hydropower, supported by insights from industry-leading research and development initiatives.

Geothermal Energy: Tapping the Earth's Potential

Geothermal energy, long valued for its baseload power capabilities, is experiencing a renaissance thanks to breakthroughs in drilling, resource utilization, and system efficiency. Traditional geothermal plants rely on naturally occurring hydrothermal reservoirs, but new technologies are expanding opportunities to regions previously deemed unsuitable.

One major advancement is **enhanced geothermal systems (EGS)** , which enable the extraction of heat from dry rock formations by creating artificial reservoirs. Coupled with optimized drilling techniques, EGS could make geothermal energy accessible in over 90% of countries, compared to the current 25% . The U.S. Department of Energy's (DOE) 2024 roadmap highlights EGS as a critical pathway to achieving 90 gigawatts of geothermal capacity by 2050, a 20-fold increase from today.

Another innovation is **geothermal cogeneration**, where facilities simultaneously produce electricity and usable heat. A recent MDPI study showcases systems that maximize geothermal water utilization, delivering efficiency rates exceeding 80% while reducing waste. Such systems are particularly impactful for district heating and industrial processes, offering a sustainable alternative to fossil fuels.

Hydropower: Reinventing a Classic Renewable

Hydropower, the oldest and largest source of renewable electricity, is evolving through technological upgrades that enhance performance, minimize environmental impact, and extend asset lifespans. Modern turbines and hybrid systems are at the forefront of this transformation.

Low-head and fish-friendly turbines are revolutionizing small-scale and run-of-river projects. Innovations like vortex turbines and Alden turbines reduce harm to aquatic ecosystems while maintaining high efficiency, even in low-flow conditions. Free-flow turbines, designed to operate without dams, are also gaining traction, enabling decentralized energy generation in remote areas.

To address infrastructure aging, companies like Enel are integrating **digital twins and AI-driven predictive maintenance** into hydropower operations. These tools optimize plant performance, reduce downtime, and lower operational costs. Additionally, hybrid systems that pair hydropower with solar-hydrogen batteries are emerging as a solution for energy storage and grid stability.

The International Hydropower Association's (IHA) 2025 Testing Network highlights 12 technology developers advancing modular turbines and retrofitting solutions for existing dams. Such initiatives aim to add 50 GW of capacity globally by 2030, leveraging underutilized infrastructure.

Cross-Sector Synergies and Future Outlook

The convergence of geothermal and hydropower innovations is fostering synergies that amplify their collective impact. For instance, **underground thermal energy storage (UTES)** systems can store excess hydropower-generated electricity as heat, which geothermal plants later utilize during peak demand. This integration enhances grid flexibility and reduces curtailment.

Both sectors are also benefiting from policy support and funding. The DOE's $45 million investment in geothermal R&D and the European Union's Hydropower Europe initiative underscore global commitment to advancing these technologies.

Geothermal and hydropower innovations are pivotal to achieving a resilient, low-carbon energy future. From EGS unlocking geothermal's global potential to AI-driven hydropower upgrades, these advancements address historical limitations while enhancing sustainability. As the energy industry accelerates its transition, stakeholders must prioritize scaling these technologies through collaboration, investment, and supportive regulatory frameworks.

Sustainability & Decarbonization

10 Sustainable Transport Solutions

ADNOC Distribution Reports Record Ebitda For Fy 2024 And Accelerates Operational Growth

Distribution, the UAE's largest fuel and convenience retailer, announced its financial results for 2024, achieving a record Earnings Before Interest, Taxes, Depreciation, and Amortization (EBITDA) of $1.05 billion (AED 3.86 billion), up 4.8% year-on-year. Underlying EBITDA, excluding inventory gains and one-off items, increased by 11.4% to $989 million (AED3.63 billion). Net profit, excluding the UAE corporate income tax impact, rose by 2.4% to $725 million (AED2.66 billion). The company also achieved a record Return on Capital Employed of 28.8%.

Operational Performance

ADNOC Distribution delivered record total fuel volumes of 15.0 billion liters in 2024, an 8.7% year-on-year increase, driven by higher mobility and international expansion in Saudi Arabia and Egypt. Fuel volumes in GCC countries grew by 7.6% to 11.9 billion liters.

The company expanded its retail network with 59 new service stations in 2024, including 30 under development in Saudi Arabia, significantly exceeding its full-year guidance. ADNOC Distribution now operates 896

stations, including 100 in Saudi Arabia, with plans to add 30-40 more in 2025.

Non-Fuel Retail Growth

The non-fuel retail business saw strong performance, with a 12.5% increase in gross profit and a 10.2% rise in non-fuel transactions. Growth was driven by increased convenience store conversions, a 33% rise in barista-prepared drinks, and expansion of car wash and lube services. Seventeen new convenience stores were added, bringing the total to 526, including standalone stores.

The company also expanded its food and beverage offerings, with 12 Burger King outlets now operating at ADNOC stations and plans for 5-10 more in 2025. The number of occupied and awarded properties increased by 10% in 2024, enhancing revenue diversification.

EV Charging and Digital Transformation

ADNOC Distribution installed 220 EV charging points in 2024, surpassing its target and marking a fourfold increase from 2023. It aims to deploy over 500 charging points by 2028, with 100 more planned for 2025. The company integrated AI-driven tools to optimize fuel delivery, enhance customer insights, and improve efficiency. The ADNOC Rewards loyalty program grew to 2.3 million members, an 18.5% increase.

Operational Efficiency and Cost Savings

The company achieved $18 million (AED66 million) in like-for-like operational cost savings in 2024, progressing toward its goal of $50 million in reductions between 2024 and 2028.

Shareholder Returns and Financial Strength

ADNOC Distribution's Board of Directors recommended a $350 million (AED 1.285 billion) cash dividend for the second half of 2024, subject to shareholder approval, in line with its commitment to pay $700 million annually through 2028. Free Cash Flow in 2024 was $756 million (AED 2.78 billion), reinforcing its strong financial position.

Future Outlook

The company remains on track to reach its 2028 targets, including operating 1,000 service stations and over 500 EV charging points. In 2025, it plans to add 40-50 new stations and double the number of Tier-1 food and beverage properties, strengthening its retail and real estate offerings.

ADNOC Distribution's strategic focus on operational efficiency, digital transformation, and international expansion positions it for sustained growth and shareholder value creation.

ADNOC

Oil & Gas

13 LNG Market & Trade Developments

Global LNG Market Set for Major Growth Despite Regulatory Challenges

The liquefied natural gas (LNG) market is poised for significant expansion over the next few decades, with global trade expected to double by 2050. According to the Gas Exporting Countries Forum (GECF), LNG volumes could reach 800 million tonnes annually by mid-century, accounting for 63% of traded natural gas. This growth is being driven by rising energy demand, particularly in Asia, and the push for cleaner energy alternatives. However, regulatory uncertainties and economic concerns in key markets, including the United States, could impact the industry›s trajectory.

Surging LNG Demand and Supply Expansion

LNG demand has been rising steadily, with major importing nations such as China, Japan, and South Korea increasing their procurement. The European market has also become a significant LNG consumer, especially after geopolitical disruptions in the Russian gas supply chain. The U.S. Energy Information Administration (EIA) forecasts that global LNG demand will continue its upward trend, driven by industrial activity and power generation needs.

To meet this growing demand, several countries have ramped up LNG production

and export capabilities. The U.S. remains a dominant player, with ongoing projects such as the Commonwealth LNG facility in Louisiana, designed to supply both Asian and European markets. Qatar, already a leading LNG exporter, is advancing its North Field expansion, which will boost its production capacity to over 126 million tonnes per annum (MTPA) by 2027.

Challenges in U.S. LNG Policy and Economic Implications

Despite the expansion of U.S. LNG exports, regulatory concerns and economic implications are causing uncertainty. A recent report by the U.S. Department of Energy (DOE) warns that unchecked LNG export growth could lead to a 30% increase in domestic gas prices by 2050, raising household energy costs by an estimated $122 per year. The Biden administration has taken a cautious stance, considering policies to regulate LNG exports to ensure domestic energy affordability and environmental sustainability.

The discussion around LNG exports has also gained political traction, as the debate intensifies over balancing energy security with climate commitments. Some industry stakeholders argue that limiting LNG exports could undermine U.S. leadership in global energy markets and weaken supply reliability for allies in Europe and Asia.

Europe›s LNG Transition and Infrastructure Investments

In the wake of the Russia-Ukraine conflict, Europe has accelerated efforts to diversify its energy mix, with LNG playing a crucial role. In 2023, European LNG imports reached record levels, with Germany, France, and the Netherlands leading the charge in securing long-term supply agreements.

Asia›s LNG Boom and Emerging Markets

Asia remains the largest LNG consumption hub, with China expected to surpass Japan as the world›s top importer. Beijing›s decarbonization policies and efforts to replace coal-fired power with cleaner alternatives have spurred long-term LNG procurement deals. India, another major player, is expanding its LNG terminal network to meet rising industrial and transportation demand.

Emerging markets in Southeast Asia, such as Vietnam and the Philippines, are also increasing LNG imports as they transition from coal-based power generation. These nations are actively developing their LNG infrastructure to support economic growth while ensuring energy security.

Environmental Considerations and Future Outlook

While LNG is often regarded as a bridge fuel in the transition to a low-carbon economy, concerns over its environmental impact persist. Critics argue that the expansion of LNG infrastructure could lock in long-term fossil fuel reliance, delaying the adoption of renewables.

To address these concerns, the industry is exploring carbon capture and storage (CCS) technologies and low-emission LNG production methods. Companies like Shell and TotalEnergies are investing in green LNG initiatives, including carbon-neutral cargoes and renewable-powered liquefaction facilities.

The LNG market is on track for significant expansion, driven by rising demand, geopolitical shifts, and the need for energy security. However, regulatory challenges, economic concerns, and environmental considerations could shape the industry›s future. As nations navigate the complexities of energy transition, LNG is likely to remain a critical component of the global energy mix for decades to come.

energyHQ Staff

Nuclear

16 Nuclear's Role Climate Mitigation

Nuclear Energy: A Revival In The Face Of Climate Change And Growing Energy Needs

In a time when climate change and the constant need for energy are reshaping our world, nuclear energy is experiencing a significant revival.

This resurgence of nuclear energy is driven by new technologies and increased political support, creating both new opportunities and challenges. In this article we explore how tech firms and project sponsors can navigate this complex terrain, ensuring they are well-positioned to tap into the potential of nuclear energy. Whether it's addressing safety concerns or navigating the insurance landscape, the road ahead is both exciting and vital for our clean energy future.

With climate change intensifying and energy demands rising, nuclear energy is becoming more important than ever. The urgency of climate change is underscored by rising sea levels and more frequent extreme weather events. This has made it imperative to find low-carbon energy solutions. The expansion of data centers, especially those powered by artificial intelligence, has dramatically increased energy consumption. AI-driven data centers are expected to use up to 400% more energy than traditional data centers, highlighting the critical role nuclear energy can play in addressing these challenges.

Nuclear renaissance

Smaller modular reactors (SMRs) and microreactors - are not only more efficient but also feature enhanced safety mechanisms. These reactors use cutting-edge fuels and cooling systems, minimizing the risk of accidents and boosting reliability.

Fusion energy - the progress in fusion energy, led by companies at the forefront of this field, holds the potential to transform the energy landscape by delivering a nearly limitless, clean, and safe power source. These breakthroughs are reshaping the industry and attracting substantial attention and investment.

Political and financial support

Bipartisan consensus - There is a strong bipartisan consensus on the importance of nuclear energy. Leading financial institutions are providing significant funding to help it grow. This renewed focus aims to meet growing energy demands while fortifying national security and energy independence.

Clean energy strategies

Low-carbon emissions and reliability - compared to other energy sources, nuclear power has the lowest carbon footprint, making it a vital component in our journey toward net-zero emissions. Moreover, its ability to deliver steady, round-the-clock energy is a clear advantage over intermittent sources like wind and solar. By addressing the challenges and dispelling the fears and misconceptions surrounding nuclear energy, we can fully harness this powerful and clean energy source, driving our collective efforts forward.

Impact of AI - We are leveraging the momentum of nuclear energy's resurgence by exploring its applications in the tech industry. In discussions with technology company clients, we focus on raising awareness about the pivotal role nuclear energy plays in clean energy strategies. As data centers and AI become more energy-intensive, the low carbon footprint and reliability of nuclear energy stand out as essential benefits that we are eager to communicate.

Educational efforts

Active engagement - engaging with key tech clients is providing them with a thorough understanding of the features of nuclear power. This includes in-depth insights into safety protocols, quality assurance, and the operational intricacies of nuclear reactors. By deepening this understanding, we aim to build confidence and trust in the technology, which is crucial for its broader acceptance. These initiatives go beyond the technology itself, addressing the wider context of energy security and environmental sustainability.

Shifts in power and insurance

Data centres - as we navigate the specifics of power delivery methods and contracts for nuclear-powered data centres, we see the potential for traditional EPC (Engineering, Procurement, and Construction) contracts to evolve into hybrid models that better align with the demands of nuclear projects.

Nuclear risk - one of the key challenges is determining the ownership of nuclear risk, particularly in the context of small modular reactors (SMRs). The complexities of licensing and regulatory compliance further underscore the importance of early and thorough engagement from all stakeholders. Together, we can address these challenges and unlock the full potential of nuclear energy.

The insurance market for nuclear power is a vital area that we are closely monitoring. Currently, this market is led by established players that offer traditional nuclear liability coverage. However, we are witnessing a growing interest from commercial insurers, and we anticipate new entrants to join the market. This trend could spur the creation of innovative insurance products designed to address the specific risks associated with nuclear projects. To build the confidence of these insurance carriers and expand their interest in nuclear risks, it is essential to educate them about the construction, operational, and decommissioning phases of nuclear projects. As the construction insurance industry integrates nuclear energy, our early engagement and thorough risk assessments will be crucial in ensuring the successful adoption of nuclear energy, ultimately contributing to a more sustainable and secure energy future.

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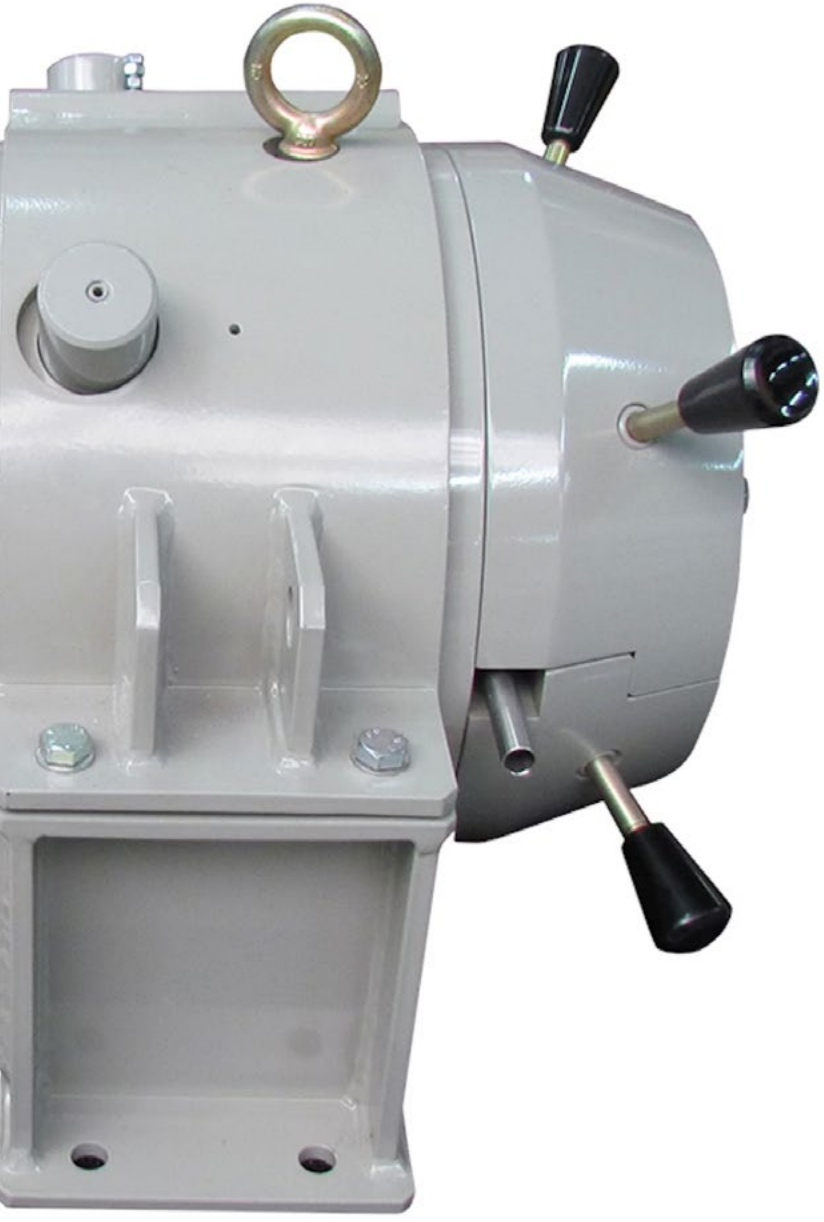
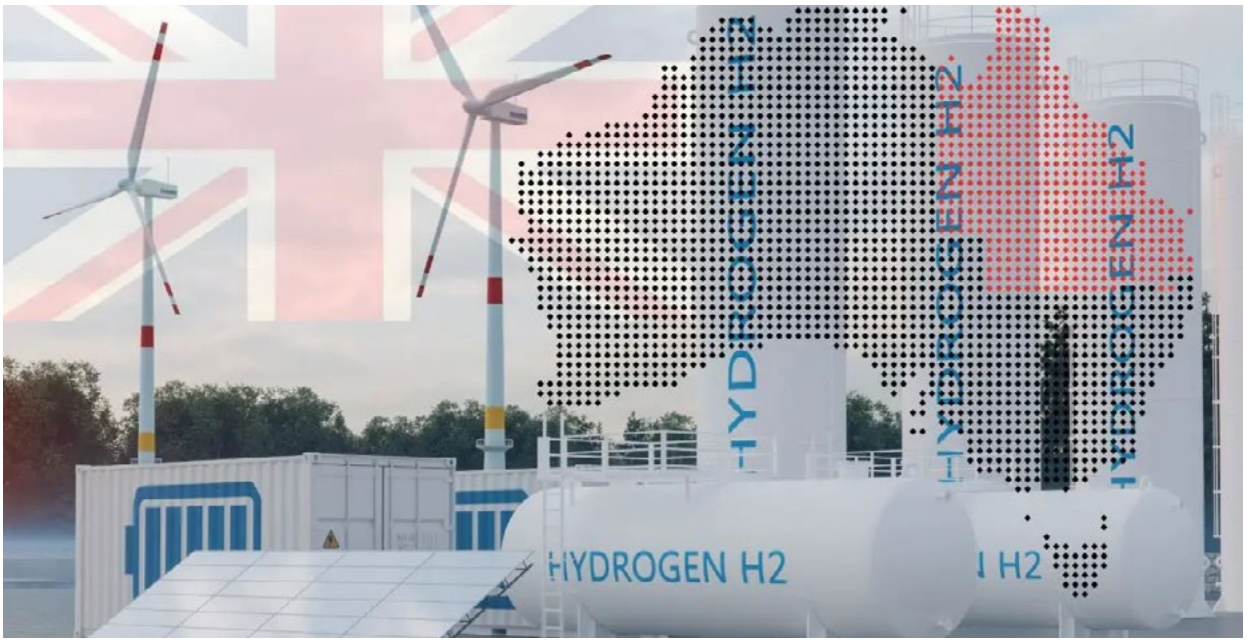


Hydrogen

21 Hydrogen Applications Across Industries

Hydrogen Applications Across Industries: Transforming Energy, Transport, and Manufacturing



Hydrogen is rapidly emerging as a key player in the global energy transition, offering a versatile, low-carbon alternative across multiple industries. From heavy industries to transport and power generation, hydrogen is reshaping operations by enabling cleaner processes and reducing reliance on fossil fuels. Here's a look at how hydrogen is being applied across different sectors:

1. **Industrial Manufacturing & Heavy Industry**
   - **Steel Production:**
     - One of the most promising applications of hydrogen is in steel manufacturing, where it replaces coal in the Direct Reduced Iron (DRI) process. Companies like H2 Green Steel, aiming for 5 million tons of near-zero steel by 2030, and Thyssenkrupp Steel, which has demonstrated a 30% CO2 reduction in pilot projects, are pioneering hydrogen-based steelmaking. Studies indicate that hydrogen-based DRI can reduce CO2 emissions by up to 92% compared to traditional blast furnaces. The steel industry accounts for roughly 7-9% of global CO2 emissions, making this a critical area for decarbonization.
   - **Chemical Industry:**
     - Hydrogen is essential for producing ammonia (used in fertilizers) and methanol (used in plastics and fuel). The shift to green hydrogen is helping companies like BASF and Yara decarbonize their chemical production processes, reducing their dependency on natural gas-derived hydrogen (gray hydrogen). The global ammonia market, where hydrogen is a key component, is projected to reach over $80 billion by 2027.

2. **Transportation & Mobility**
    - **Hydrogen Fuel Cell Trucks & Buses:**
        - Fuel cell electric vehicles (FCEVs) are gaining traction in long-haul trucking and public transport. Companies like Daimler Truck, Volvo, and Hyundai are rolling out hydrogen-powered heavy-duty trucks. The global fuel cell vehicle market is projected to experience a CAGR of over 60% from 2023 to 2030. Cities like Aberdeen and Rotterdam are deploying hydrogen-powered buses, with some fleets demonstrating over 350km of range.
    - **Maritime & Shipping:**
        - Hydrogen-powered ships, such as the Energy Observer, demonstrate the feasibility of hydrogen in maritime applications. Maersk and CMB.TECH are investing in hydrogen-based fuels to meet IMO 2050 decarbonization targets. The maritime sector is aiming for a 50% reduction in greenhouse gas emissions by 2050 compared to 2008 levels.
3. **Energy Storage & Power Generation**
    - **Grid-Scale Energy Storage:**
        - Hydrogen enables long-duration energy storage by converting surplus renewable electricity into hydrogen through electrolysis. This hydrogen can be stored and converted back into electricity during periods of low renewable energy production. Global electrolyzer capacity is expected to increase from several gigawatts currently, to over 800 GW by 2030.
    - **Hydrogen Gas Turbines:**
        - Power plants are incorporating hydrogen-blended fuels in gas turbines to reduce emissions. General Electric (GE) and Mitsubishi Power are pioneering hydrogen-ready turbines capable of operating on 100% hydrogen. Modern gas turbines are reaching over 60% efficiency in combined cycle operation, and hydrogen turbines are expected to attain similar levels.
4. **Hydrogen Infrastructure & Market Growth**
    - Europe's Hydrogen Backbone Initiative is creating a hydrogen pipeline network across 21 countries, aiming for over 53,000 km of hydrogen pipelines by 2040.
    - Japan and South Korea are heavily investing in hydrogen refueling stations and industrial applications. South Korea has set a goal of deploying over 6.2 million fuel cell vehicles by 2040.
    - The U.S. Hydrogen Hubs Program aims to establish regional clean hydrogen production and distribution networks, with $7 billion allocated for these projects.

Hydrogen's Expanding Role

Hydrogen's applications across industries are rapidly evolving, presenting significant opportunities for businesses looking to decarbonize operations. While challenges such as production costs (with green hydrogen projected to reach cost parity with grey hydrogen by 2030) and infrastructure development remain, technological advancements and policy support are driving hydrogen's role as a key pillar of the clean energy transition.

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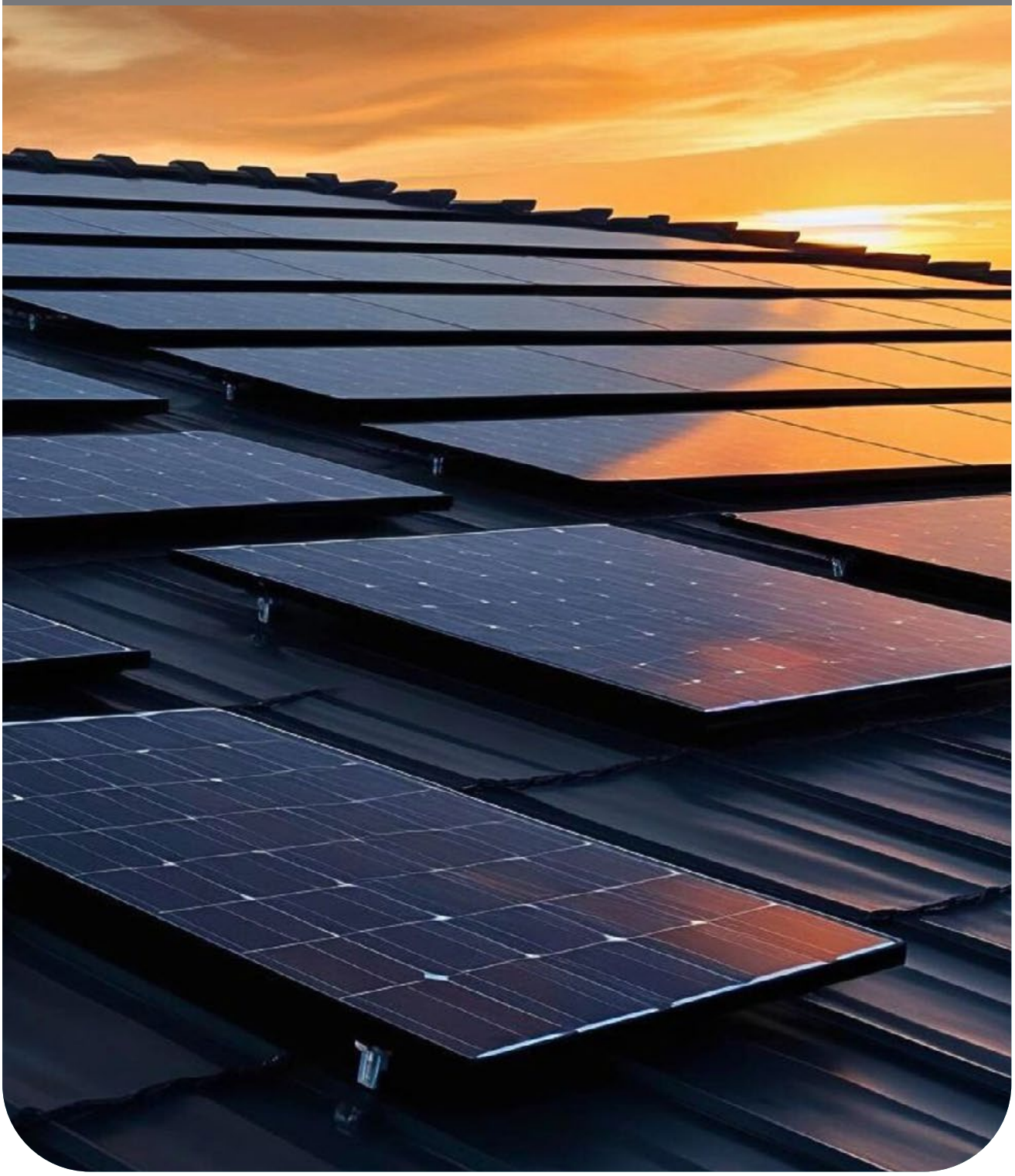
Cover Story

24 Industrial Solar Expansion



Under the patronage of MODON: SIG launches 2-megawatt solar power plant in Saudi Arabia partnering with Yellow Door Energy

Major milestone in SIG's journey toward decarbonizing its global operations

Riyadh, Saudi Arabia – March 12, 2025: Today marks a significant milestone for SIG and Yellow Door Energy as they officially launched SIG›s 2-megawatt solar project in Riyadh. The project, under the patronage of Saudi Authority for Industrial Cities and Technology Zones («MODON"), emphasizes the importance of greening industrial cities and supporting the MODON Green Initiative.

This solar project aligns with SIG's ambitious sustainability strategy, which aims to create packaging solutions that deliver more to society and the environment than they take. As part of this strategy, SIG is focused on reducing greenhouse gas emissions across its entire value chain, investing in renewable energy, and exploring circular economy practices that minimize waste and maximize resource efficiency.

The 2-MWp solar plant will be one of the first on-grid industrial solar projects in Saudi Arabia directly connected to an industrial plant. Covering 8,000 square meters, the solar installation will feature over 3,200 solar panels. The initiative will reduce carbon emissions by 1,300 metric tons annually,

contributing to SIG's Climate+ targets while supporting Saudi Arabia's Net Zero Emissions by 2060 goal.

MODON commented: "At MODON, we

are committed to fostering a sustainable industrial ecosystem. The MODON Green Initiative encourages manufacturers in our industrial cities to switch to clean electricity and contribute to Saudi Vision 2030. By adopting solar energy, industrial facilities can reduce energy costs, enhance their economic resilience and achieve their sustainability objectives. This project, with a generation capacity of 2 megawatts, is another step in MODON's journey toward sustainability. However, it is neither the first nor the last, as a series of upcoming initiatives will follow the same path, reinforcing our commitment to contributing to the ambitious Vision 2030."

Abdelghany Eladib, President & General Manager, India, Middle East and Africa at SIG, commented: "This solar project is a pivotal step forward for SIG as we accelerate our Climate+ commitment in line with our global sustainability goals. By tapping into renewable energy in partnership with Yellow Door Energy, we are enhancing the sustainability of our operations and contributing to Saudi Arabia's green energy ambitions under the Saudi Green Initiative."

This is SIG's second renewable energy project with Yellow Door Energy, following a successful 304-kilowatt solar power plant in Dubai, UAE. The Dubai installation includes a rooftop solar array, solar carport, and electric vehicle charging station – demonstrating SIG's commitment to renewable energy adoption across the Middle East.

Khaled Chebaro, Country Director for KSA at Yellow Door Energy, added: "We are proud to support SIG's Climate+ ambition and contribute to MODON's Green Initiative, bringing renewable energy to Riyadh Second Industrial City. Through our solar lease, we enable businesses to reduce energy costs and decarbonize their operations. Together, we are driving progress toward Saudi Arabia's Net Zero Emissions by 2060 target and building a sustainable energy future for generations to come."

Under the solar lease agreement, Yellow Door Energy is responsible for financing, designing, constructing, operating, and maintaining the solar power plant throughout its lifecycle while SIG remains focused on sustainable packaging solutions for its customers.

SIG

Energy Storage & Grids

27 Smart Grid Technologies & Management

ETIP SNET Seeks Input For Strategic Paper On AI In Smart Grids

ETIP SNET is conducting a wide-range discussion on the transformative potential of artificial intelligence and generative AI, gathering contributions from all partners and stakeholders involved in the transformation.

The European Commission created the European Technology and Innovation Platforms (ETIPs) for stakeholders and experts from the energy sector. The role of ETIP Smart Networks for Energy Transition is to guide research, development and innovation (RD&I) to support Europe's energy transition. One of its main tasks is to set out a vision for smart grids and engage stakeholders.

ETIP SNET identifies innovation barriers, notably related to regulation and financing, and develops knowledge-sharing mechanisms

for the deployment of RD&I results.

It released the first draft of upcoming strategic position paper Unlocking the Potential of Artificial Intelligence (AI) and Generative AI (GenAI) in Smart Grids: A Guide for Action.

Three surveys for stakeholders, experts, solution providers

Surveys are up until February 23 for stakeholders, experts and solution providers. The main one is for general insights and opinions. The ongoing initiatives survey was launched to collect and integrate perspectives on innovation and best practices for the roadmap. Solutions and services providers have an additional questionnaire.

A webinar is scheduled for March 13 and registrations are ongoing. ETIP SNET said the team would share the version 2.0 at the session, one day before its scheduled release.

The session is an opportunity to explore the latest strategic developments, contribute to the collective vision and collaborate on key recommendations, according to the call. ETIP SNET declared the previous webinar a huge success, having 480 participants.

ETIP SNET developing strategic roadmap

The final version of the comprehensive guide is due on April 3. It is an analysis of the policy landscape and technological innovations, the authors said. The aim is to develop a strategic roadmap for energy ecosystem stakeholders.

"Given the European Union's recent commitment to mobilize EUR 200 billion for AI investments, as highlighted at the Paris AI Summit, discussions on integrating AI into our energy infrastructure are more timely than ever. This significant investment underscores the critical importance of AI in shaping Europe's future," said ETIP SNET Digitalisation of Energy and Customer Engagement Chairwoman Elena Boskov Kovacs.

AI, GenAI are tools for enhancing smart grids

The energy transition is not just an environmental necessity but also a strategic imperative for Europe's economic competitiveness and energy security, the draft reads. The deployment of digital technologies, particularly AI, is seen as essential to manage the complexities of the energy transition, according to the document.

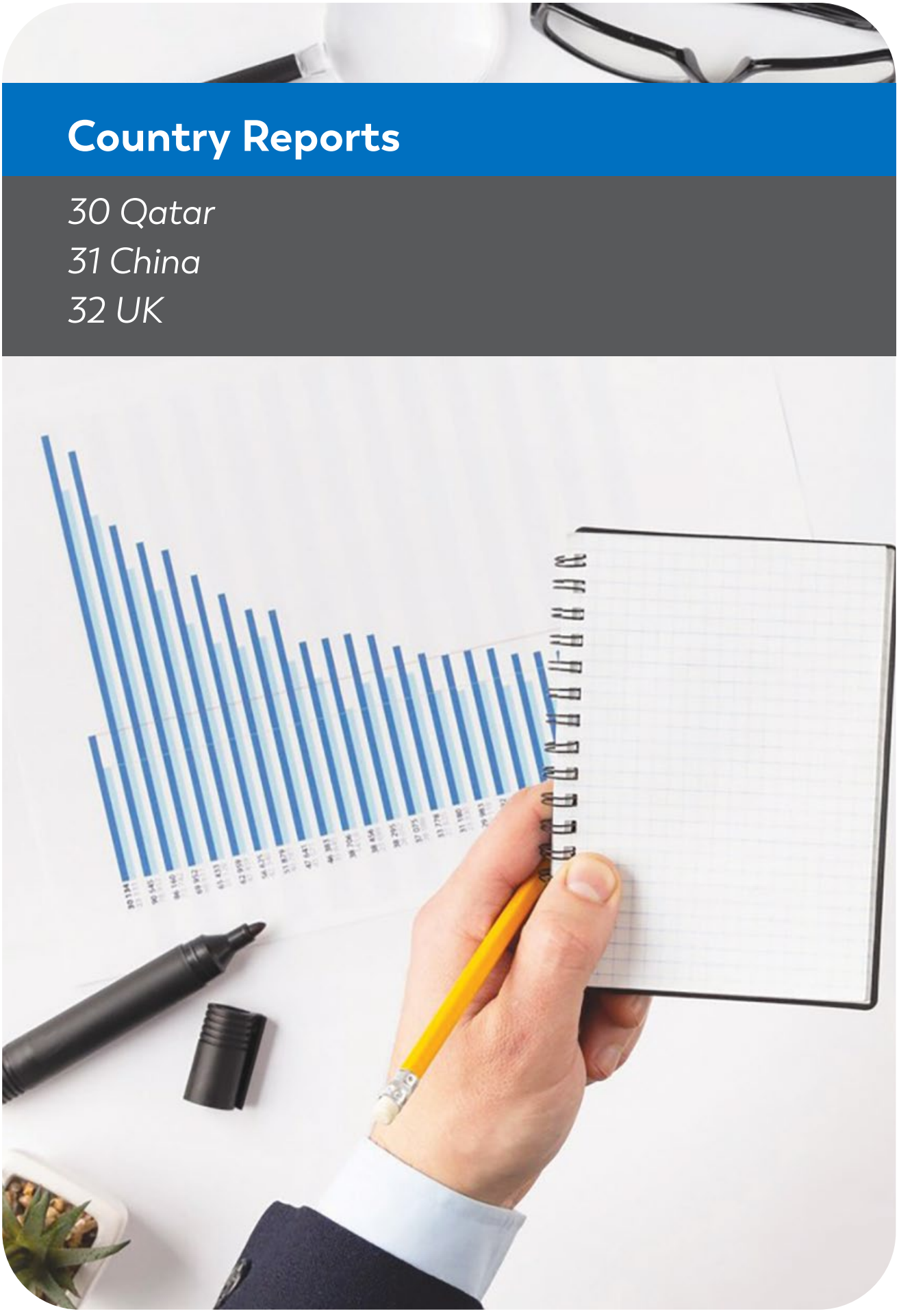
The authors pointed to the need to address the issue of energy justice, ensuring that the benefits of the transition are shared by all, and that no one is left behind. They added that smart grids enable near real-time monitoring, dynamic demand response and seamless integration of decentralised renewable energy resources. Such systems facilitate a more interactive and responsive energy system, allowing for better management of energy supply and demand, ETIP SNET said.

"AI and GenAI are emerging as powerful tools for further enhancing the capabilities of smart grids. These technologies can process vast amounts of data, optimise grid operations, and enable new functionalities previously unattainable... AI algorithms analyse data from various sources, such as smart meters, sensors and weather forecasts, to improve grid management. This includes optimising energy distribution, predicting equipment failures, and managing demand," the document adds.

GenAI can synthesise new data and generate scenarios for strategic decision-making, supporting grid planning and operation, the authors wrote. According to the draft, AI plays a vital role in detecting and mitigating cyber threats to ensure the security of the critical infrastructure of smart grids.

https://balkangreenenergynews.com/

Country Reports



Qatar, India Discuss Energy Sector Ties

Held on the sidelines of the India Energy Week 2025, the meetings focused on existing and future cooperation.

Minister of State for Energy Affairs and President and CEO of QatarEnergy, H E Eng. Saad bin Sherida Al Kaabi held meetings with Minister of Petroleum and Natural Gas in the Republic of India, H E Hardeep Singh Puri, Minister of Energy and Oil in the Republic of the Sudan, H E Dr. Mohieddin Naeem Mohamed Saeed, and advisor for the Ministry of Power, Energy and Mineral Resources of the People's Republic of Bangladesh, H E Muhammad Fouzul Kabir Khan.

Held on the sidelines of the India Energy Week 2025, the meetings focused on existing and future cooperation, and on further strengthening bilateral relations in the energy sector between Qatar and their countries.

Seperately, Minister Al Kaabi held cooperation talks with senior executives of major Indian energy companies, on the sidelines of the India Energy Week 2025, taking place in New Delhi.

He met with Chairman of Indian Oil Corporation, A. S. Sahney; Managing Director of Gujarat State Petroleum Corporation Limited, Gujarat Gas Limited, Milind Torawane; and Managing Director of Petronet Energy Limited, Akshay Kumar Singh.

The discussions during the three meetings focused on present and future cooperation, and on further strengthening bilateral relations in the energy sector.

https://www.zawya.com/

China Energy Group Achieves Milestone with Over 5 Million Cubic Meters of Green Hydrogen Production

- China National Energy Group reports significant progress in its hydrogen energy sector, achieving over 5 million standard cubic meters of cumulative green hydrogen production.
- The Qingshuiying Hydrogen Production Plant in Ningxia marks eight months of safe, stable operations, emphasizing China›s advances in integrating renewable energy with the coal chemical industry.

China National Energy Group has reached a notable milestone in its hydrogen energy operations, successfully producing over 5 million standard cubic meters of green hydrogen. This achievement was announced following the successful parallel operation of five electrolyzers at the Qingshuiying Hydrogen Production Plant, located in the Ningdong Renewable Hydrogen Carbon Emission Reduction Demonstration Zone in Yinchuan, Ningxia.

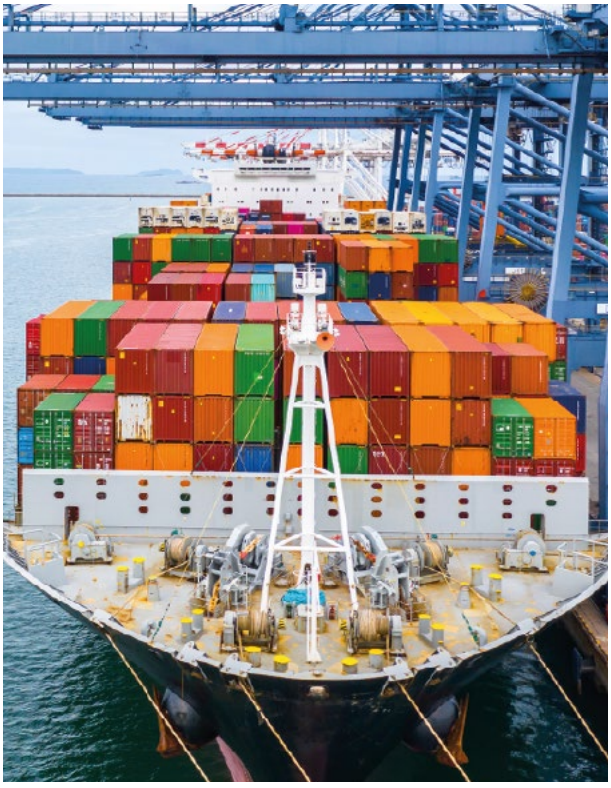
Since its trial operation began in June 2024, the plant has demonstrated remarkable performance, consistently producing over 5.1 tons of green hydrogen daily. This steady output has contributed to a record-setting two-month production streak, where the green hydrogen output remained stable at over 100 tons, marking a new high for the State Energy Group.

The success of the Qingshuiying Hydrogen Plant is part of a broader strategy by the National Energy Group to integrate new energy sources like green hydrogen with traditional coal chemical processes. This approach not only showcases the potential for sustainable industry practices but also provides valuable insights into the scalable production of green hydrogen.

Looking forward, the National Energy Group plans to expand its influence in the hydrogen market by promoting the coupling of green hydrogen production with other industrial applications, such as coal chemical industry, coal-to-oil, and transportation. Additionally, the group is set to accelerate the demonstration and implementation of projects involving green ammonia, green alcohol, and offshore hydrogen production, further contributing to the commercialization and market-oriented development of China's hydrogen energy industry.

https://fuelcellsworks.com/

Time To Act on UK's Expiring Trade Remedy Measures



Some UK anti-dumping and anti-subsidy measures will expire in 2026. Affected UK producers can apply for an expiry review if they want the measures to be kept.

In 2026, some anti-dumping and countervailing trade remedy measures that currently defend UK businesses from unfair trading practices will expire. The window for affected domestic producers to apply for an expiry review has now opened.

The period for industry to request an expiry review for the measures listed below runs from January 2025 to end October 2025. We are already contacting the industries affected by the measures, but producers should be ready to consider now if they will request an expiry review to TRA.

The measures that expire in January 2026 cover the following goods:

- Welded steel tubes and pipes
- Rainbow trout
- Biodiesel
- Glass fibre
- Wire rods

UK producers of these goods that believe the expiry of these measures could lead to a resurgence of dumping or subsidisation that would cause injury to their industry can apply for an expiry review. To complete the application process, producers will need to provide sufficient evidence that allowing the measures to lapse would be likely to result in continued or recurring harm to their business.

Requests for expiry reviews for the measures listed above must be submitted between January and October 2025. Interested UK producers should consider if they need to act now to ask the TRA to investigate if there is a case for extending the measure.

If a request is not submitted between January to October 2025 for these measures, this would result in the relevant measure expiring automatically in January 2026 and potentially leave domestic producers vulnerable to imports at unfair prices.

The TRA's Pre-Application Office offers support in explaining the review process, reviewing submitted information, and checking draft applications and requests for reviews. The TRA operates as an independent body, so it cannot source information or complete applications on behalf of industry members.

For those looking to understand the expiry review process further, comprehensive guidance is available online. This resource is designed to help UK producers understand the necessary steps to submit a successful application and ensure that their interests are adequately protected in the face of potentially unfair trading practices.

All UK producers who have a current trade remedy measure protecting their goods can keep up to date with the expiry date of their measure and when the expiry window opens using the Trade Remedies Service. The TRA will publish information on other measures that will expire as the expiry window approaches, specifying the deadlines when producers must submit any request for an expiry review.

The UK's steel safeguard measure which covers certain steel products also ends in summer 2026. Unlike anti-dumping and anti-subsidy measures, it cannot be renewed or extended. Any relevant UK producers who would like to know more about the options available to protect their industry should contact the TRA's Pre-Application Office.

www.gov.uk

Services

34 Coming Events

Coming Events

IPAF Summit 2025
Dublin, Ireland
12 - 13 Mar 2025
https://iapa-summit.info/

The International Awards for Powered Access (IAPAs) recognize industry excellence in equipment, engineering, safety, and training across 13 categories. Organized by IPAF and...

Electric Vehicle Philippines 2025
SMX Convention Center, Taguig, Philippines
19 - 21 Mar 2025
https://www.philenergyexpo.com/

The Electric Vehicle Philippines exhibition will feature the latest alternative energy solutions in the Renewable Energy, Energy Efficiency, Electric and Power, Electric Vehicle...

Solar & Storage Live Africa 2025
Johannesburg, South Africa
25 - 27 Mar 2025
www.terrapinn.com

Solar & Storage Live Africa is Africa›s largest renewable energy exhibition that celebrates the technologies at the forefront of the transition to a greener, smarter, more...

Middle East Energy 2025
Dubai World Trade Centre, Dubai, UAE
07 - 09 Apr 2025
www.middleeast-energy.com

Middle East Energy is known as the top energy event in the MENA region, connecting global buyers and sellers to showcase products and solutions for cleaner and sustainable power...

Petroleum Istanbul 2025
Büyükçekmece, Turkey
24 - 26 Apr 2025
https://petroleumistanbul.com.tr/en/home-2/

Petroleum Istanbul, petroleum, LPG, lubricants, car wash, station market products, and technology fair brings together all public institutions and organizations in the energy...

SolarEX Istanbul 2025
Bakırköy/Istanbul, Turkey
10 - 12 Apr 2025
https://solarexistanbul.com/

Solar Energy Technologies and Energy Storage Exhibition «SolarEX Istanbul» -our country›s first and only solar energy themed fair- is fair which provides a chance for Turkey to take...

Intersolar Europe 2025
ICM, Munich, Germany
06 - 09 May 2025
https://www.intersolar.de/

Intersolar Europe is a leading exhibition in the solar industry, featuring photovoltaics, solar thermal systems, and power plants. It offers a platform for global industry leaders to explore...

ICSMARTGRID 2025
Glasgow/United Kingdom
27-29 May 2025
https://www.icsmartgrid.org/

The purpose of the International Conference on Smart Grid (icSmartGrid) is to bring together researchers, engineers, manufacturers, practitioners and customers from all over the world to share...

General Queries & Contact Info

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Everything about energyHQ ~ Here!

https://www.energyhq.world/energyHQ_Media%20Kit_2025.pdf

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https://www.energyHQ.world/GPO%20-%20Copy.html

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The Role of Energy Storage Technologies In The Energy Transition

There is a growing need to increase the capacity for storing the energy generated from the burgeoning wind and solar industries for periods when there is less wind and sun. This is driving unprecedented growth in the energy storage sector and many countries have ambitions to participate in the global storage supply chains.

According to Robert Piconi, Chief Executive Officer of Energy Vault, "With clean energy rapidly gaining momentum, we are seeing heightened demand for energy storage infrastructure to solve for intermittency issues. There is no one-size-fits-all solution as far as energy storage is concerned. The scale-up of a diverse mix of hardware and software technology solutions will be essential."

Market growth

Energy storage creates a buffer in the power system that can absorb any excess energy in periods when renewables produce more than is required. This stored energy is then sent back to the grid when supply is limited. It also plays an important role in times of any grid emergency, it can supply the grid with enough power in a short duration to prevent grid failures.

Batteries are at the core of the recent growth in energy storage, particularly those based on lithium-ion. Batteries for energy systems are also strongly connected with the electric vehicle market, which globally constitutes 80% of battery demand.

The global energy storage market in 2024 is estimated to be around 360 GWh. It primarily includes very matured pumped hydro and compressed air storage. At the same time, 90% of all new energy storage deployments took place in the form of batteries between 2015 to 2024. This is what drives the growth.

According to Bloomberg New Energy Finance, the global energy storage market is expected to grow six-fold to more than 2 TWh by 2030. Annual deployments are expected to grow by an average of 21% per year and triple by 2030.

China represents 43% of this future market followed by the United States, with a 14% market share. It is expected that China will remain the leader in the energy storage space with Europe and India taking up the third and fourth largest market positions by 2030.

Cost fall

The cost of lithium-ion batteries has dropped more than 90% over the last decade; 2024 saw a 40% drop in costs. The prices of battery cells are expected to continue this downward trend in the coming years, making it even more attractive as an energy storage option for end-use deployments.

Continuous innovation and increasing scale help continuously drive costs down. Most recent price drops are, however, often attributed to a global oversupply of batteries. For example, BNEF projects that as of 2024, China alone produces enough batteries to cater to the entire global demand. The US and Europe are believed to manufacture batteries at a cost premium of 20% more than batteries produced in China.

By Debmalya Sen
www.weforum.org

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