

# energy HQ

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# Advancing Sustainability in Energy: Compliance and Beyond



The energy industry is navigating a dynamic period of transformation, marked by groundbreaking innovations and heightened sustainability efforts. As governments and organizations continue to enforce stricter regulations, compliance solutions have become a cornerstone of operational strategy. However, this is only one piece of a larger puzzle, with significant advancements shaping renewable energy, grid modernization, and carbon reduction initiatives.

Innovations in energy compliance solutions have gained prominence as companies strive to meet evolving regulatory requirements. Recent developments include AI-powered platforms that automate energy usage tracking and emissions reporting. By leveraging machine learning, these tools provide actionable insights to optimize consumption while ensuring adherence to stringent standards. Additionally, blockchain is emerging as a trusted technology for maintaining transparent and tamper-proof records, further enhancing regulatory confidence.

Another noteworthy trend involves integrating IoT devices with compliance frameworks. Smart sensors and monitoring systems now enable real-time tracking of environmental impact, streamlining reporting processes and reducing operational inefficiencies. These technologies collectively represent a critical 45% of current industry advancements, emphasizing the importance of compliance in achieving sustainability goals.

Beyond compliance, the energy sector is witnessing remarkable progress in renewable energy deployment. Solar and wind technologies are reaching unprecedented levels of efficiency, supported by innovations in energy storage systems. Advanced battery solutions are making it possible to store and utilize renewable power more effectively, ensuring a consistent and reliable energy supply.

Grid modernization remains a focal point as utilities adopt smart grid technologies to enhance energy distribution and minimize losses. These systems use real-time data analytics to balance supply and demand, paving the way for a resilient and adaptive energy infrastructure. Efforts in this area not only improve efficiency but also facilitate the integration of diverse energy sources.

Decarbonization initiatives are also gaining momentum, with carbon capture and utilization (CCU) technologies advancing rapidly. These systems transform captured CO<sub>2</sub> into usable products, offering innovative pathways to reduce emissions while generating economic value.

While innovations in compliance solutions underscore the industry's commitment to regulatory alignment, the broader focus on renewable energy, grid efficiency, and decarbonization highlights its transformative trajectory. Together, these advancements demonstrate the energy sector's dedication to fostering a sustainable and resilient future.

## In This Issue!

**energyHQ's** December 2024 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 The Future of Renewable Energy
- Article on page 16 focuses on The Fukushima Legacy & Lessons Learned
- Article on page 24 sheds the light on Energy Compliance Solutions

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  
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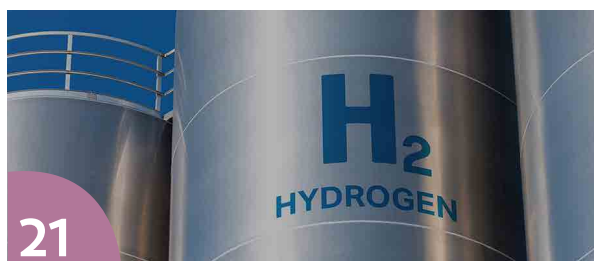
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# World Digest



## China



### China's New Renewable Energy Plan: Key Insights for Businesses

China's new renewable energy plan aims to significantly boost the country's renewable energy consumption, setting ambitious targets for 2025 and 2030. Unlike previous plans focused primarily on capacity installation, the new strategy emphasizes maximizing renewable energy utilization through infrastructure upgrades and sectoral integration across industries, including transportation, agriculture, and manufacturing. This shift is expected to create substantial business opportunities in green technologies, grid modernization, and clean energy sectors.

China is reshaping the global energy landscape, setting its sights on an ambitious transformation driven by renewable energy. In its latest move, on October 30, 2024, the Chinese government unveiled the Guiding Opinions on Vigorously Implementing the Renewable Energy Substitution Initiative (hereinafter the "new renewable energy plan") to accelerate renewable energy consumption.

The new renewable energy plan, issued by the National Development and Reform Commission (NDRC) and five other agencies, targets to increase annual renewable energy consumption to:

1 billion tons of standard coal equivalent (SCE) by 2025—a 30 percent jump from 2023 levels; and

5 billion tons of SCE by 2030—another 36 percent jump from the 2025 levels.

## UAE



### A global pioneer in energy

Despite its relatively small size, the UAE ranks among the world's top 10 nations by oil and gas reserve volume. The Abu Dhabi National Oil Company (ADNOC) is responsible for nearly all of the country's hydrocarbons production. Given profits and royalties from its oil and gas sector, the country has traditionally allotted high levels of investment to its greenfield projects to keep reserves and production robust.

The oil and gas sector is the UAE's economic axis, representing 40% of its GDP. However, the government has pushed to diversify the economy through its Vision 2030 initiative, which envisions building strong manufacturing and downstream sectors. But while non-oil sectors are becoming a more prominent part of the GDP, hydrocarbons production remains the country's key economic pillar and main enabler of this diversification. The UAE targets 5 million bopd of production by 2027 to meet soaring energy demand worldwide. Moreover, natural gas is seen as a transitional fuel that will make up 38% of the country's energy mix by 2050.

The UAE is also expanding the role of renewables in its energy mix. The government is targeting a share of 50% of power generation from nuclear and renewables by 2050. "The UAE follows a positive, pragmatic approach to the energy transition as it continues to meet the global energy needs of today, while investing heavily in the new energy systems of tomorrow," Minister of Energy and Infrastructure H.E. Suhail Mohamed Al Mazrouei told The Energy Year.



## Jordan

### Jordan's new electricity law encourages investment in energy storage

The new law aims to improve the efficiency and reliability of Jordan's electricity infrastructure and introduces the concept of energy storage in the country's legislation for the first time.

Jordan has adopted a new electricity law that replaces the temporary legislation enacted in 2002 and encourages investment in electricity storage and green hydrogen projects under the public-private partnership (PPP) model.

Minister of Energy and Mineral Resources, Saleh Kharabsheh, has said that the key benefits that distinguish the new law from the previous temporary regulations include provisions for licensed entities involved in electricity transmission, generation, or distribution to establish and operate energy storage facilities.

The minister also noted that the law allows private individuals to construct and operate their own energy storage stations for personal use, which is in turn expected to bolster grid security and encourage sustainable energy practices.

Furthermore, Kharabsheh said the new law will support green hydrogen projects by allowing self-generation and independent transmission of electricity without reliance on the national grid.

Today, Jordan is one of the biggest energy importers in the world, with over 90% of the nation's energy supply sourced abroad. According to the data from the International Energy Agency (IEA), in 2022, the country sourced over 47% of its total energy supply from oil and more than 41% from natural gas. Renewables accounted for 7.7% of the total energy supply and a staggering 74% of domestic energy production.



## Finland

### The Journey Towards Renewable Energy and Climate-Friendly Solutions Continues

The goal set by the Finnish Government as stated in the 2019 Government Programme is that Finland will become carbon neutral by 2035 and carbon negative shortly thereafter. As a result, the political atmosphere is in general aiming towards more environmental and climate-friendly solutions in every political and industrial sector.

The Russian aggression in Ukraine has further accelerated the green transition, as the ability to produce energy from CO<sub>2</sub>-free sources has become vital not only from a climate point of view, but also from the perspectives of energy self-sufficiency and security of supply.

More efficient energy production with lower emissions is required to adapt to climate change and green transition, which in general will require new technologies and raw materials. Thus, green transition impacts the mining of minerals, which to some extent are considered critical for the green transition. Recent crises and the uncertainty caused by them have increased the importance of availability of raw materials and self-sufficiency in them as well as the need to diversify supply chains.

Finland will hold parliamentary elections in the Spring of 2023, as a result of which many of the pending legislative reforms are currently on hold. As the importance of the green transition has widely been recognised across the political spectrum, however, it is expected to remain one of the top priorities on the political agenda even during the upcoming period of governmental change.



## United Kingdom

### The largest sources of emissions in the UK are power stations, steelworks and refineries

Power stations dominate among largest sources of carbon emissions

The UK power stations emitted around 50 million tonnes of CO<sub>2</sub> last year, new figures show from recent complete emissions data for 2023. These large power plants include biomass, gas and coal powered electricity, though the last UK coal power plant, Ratcliffe, closes in September 2024.

Over time, UK power sector emissions have reduced as wind and solar power displace coal and gas generation. Emissions have fallen 78% since 1990, with UK electricity demand falling by around 6% across the same period.

Other large industrial plants also feature in the top emitters list

Large metalworks sites such as at Port Talbot and Scunthorpe feature in the top 10 largest single sources of emissions, as well as three of the six large UK refineries, Fawley, Pembroke and Stanlow. In total the refineries and steelworks plants in the UK largest emitters tables emit the equivalent of 5% of total UK emissions, compared to 12% from the power sector.



## Saudi Arabia

### Balancing Energy Demands With Environmental Responsibility

Saudi Arabia is tackling the energy trilemma by aiming for a reliable, affordable, and sustainable energy supply. The Kingdom's Vision 2030 includes a target for net-zero emissions by 2060. Here Saudi Arabia is working to grow its economy while protecting the environment. The country is adding renewable energy sources and energy-efficient practices across many sectors. At the same time, it's cutting back on its dependence on oil.

In 2024, the government made significant strides to tackle these goals. It expanded renewable energy infrastructure to prepare for a greener future. By 2030, Saudi Arabia aims to add up to 130 GW of renewable energy capacity. These steps support economic growth and build a stronger, more sustainable energy system.

Saudi Arabia is Boosting its Renewable Energy Green Initiatives

The Kingdom's renewable energy initiatives are expanding rapidly. By September 2024, the Kingdom secured over 19 gigawatts of renewable energy projects. They anticipate that almost 5 gigawatts of these projects will be operational by the end of the year. These ambitious goals align with the Saudi Green Initiative. This initiative aims to cut carbon emissions, protect natural resources, and preserve biodiversity by 2030.

# Renewable Energy

## *07 The Future of Renewable Energy*





# The Future of Renewable Energy: Opportunities and Challenges in the Evolving Landscape



The renewable energy sector is at a pivotal juncture, poised to redefine global energy systems while driving economic growth and fostering sustainability. This transformation, however, brings a host of opportunities and challenges that require strategic foresight and collaborative efforts. Understanding the dynamics shaping the future of renewable energy is crucial for stakeholders across the value chain.

## Unprecedented Growth and Innovation

The renewable energy industry has witnessed remarkable expansion, fueled by advances in technology, policy support, and societal demand for cleaner energy solutions. The U.S. Department

of Energy's 2024 report highlights a 4.2% growth in clean energy jobs, significantly outpacing the overall economy's growth rate. This trend reflects the sector's robust performance, driven by solar, wind, and energy storage technologies.

In parallel, modernization initiatives such as grid upgrades and infrastructure development are unlocking new efficiencies. For instance, investments under initiatives like the Bipartisan Infrastructure Law (BIL) are enhancing the resilience and capacity of energy systems. These advancements are not only reducing emissions but also creating high-quality jobs that contribute to economic stability.

## Talent Gaps and Workforce Development

Despite its potential, the renewable energy sector faces a critical challenge: a significant talent gap. Predictions of a seven-million-worker shortfall globally by 2030 could hinder the sector's ability to meet its ambitious goals. Addressing this gap requires a multifaceted approach that aligns workforce development with the industry's needs.

The upcoming workforce comprises Millennials and Gen Z—generations that prioritize meaningful work and sustainability. Recent surveys indicate that nearly 90% of these individuals seek careers aligned with their values, offering a unique opportunity for the renewable energy sector to attract purpose-driven talent. However, misconceptions about job requirements and limited awareness of non-technical roles remain barriers. Bridging this gap through targeted educational outreach and awareness campaigns is vital.

### **Policy-Driven Momentum**

Government policies continue to be a cornerstone of renewable energy growth. The Inflation Reduction Act (IRA) of 2022 and the BIL have provided substantial incentives, driving the adoption of renewables and spurring project development. Over 330 projects initiated since the IRA's enactment are set to create over 109,000 jobs, reflecting the sector's dynamism.

These policy frameworks offer a stable foundation, yet the industry must remain adaptive to potential policy shifts. Strategic partnerships with states and private investors can ensure continuity, even amidst changing federal priorities. By leveraging innovative financing models and emphasizing workforce development, the sector can sustain its upward trajectory.

### **Overcoming Misconceptions**

While renewable energy is often perceived as a technical field requiring specialized degrees, the reality is far more inclusive. Opportunities abound in areas such as marketing, policy advocacy, installation, and maintenance, many of which do not demand advanced technical qualifications. By redefining the narrative around renewable energy careers, the industry can appeal to a broader and

more diverse talent pool.

Furthermore, initiatives aimed at STEM education and sustainability programs in schools can cultivate interest and build a pipeline of skilled professionals. Companies that invest in employee development and offer career advancement opportunities are more likely to attract and retain talent.

### **The Role of Private Sector and Community Engagement**

The private sector plays a pivotal role in shaping the future of renewable energy. Organizations must not only innovate but also actively engage with communities to build awareness and foster trust. Partnerships with educational institutions and community organizations can enhance recruitment efforts and provide hands-on experiences that resonate with young professionals.

Apprenticeships, internships, and mentorship programs are particularly effective in demystifying renewable energy careers and showcasing their impact. By creating pathways for career entry and growth, the sector can solidify its appeal to the "Impact Generations."

### **A Sustainable Path Forward**

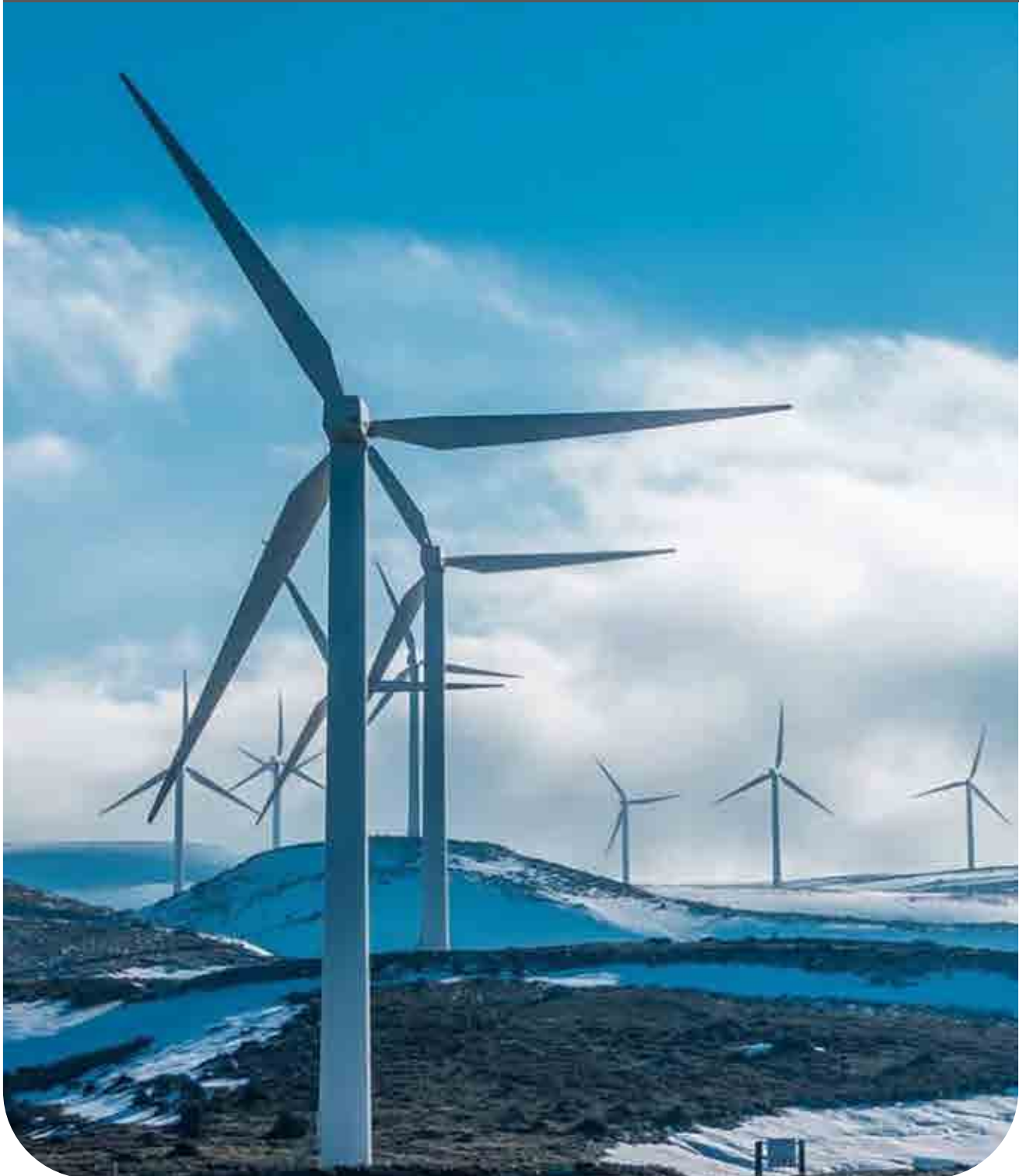
The renewable energy sector stands as a beacon of opportunity in the global transition to sustainability. By addressing talent shortages, leveraging policy incentives, and embracing innovation, the industry is well-positioned to lead the energy transformation. However, success will depend on its ability to adapt, collaborate, and inspire the next generation of professionals.

As businesses, governments, and communities align their efforts, the renewable energy sector can achieve its dual goals of environmental stewardship and economic resilience. The future of renewable energy is not just about technology—it is about people, purpose, and progress. Together, these elements will define the sector's legacy in shaping a sustainable world.

**By energyHQ Staff**

## Sustainability & Decarbonization

### *10 The Future of Sustainability*



# Empowering a Greener Future: The Role of AI in Energy Sustainability

As global energy demands surge, balancing technological advancement with environmental stewardship becomes increasingly crucial. The energy sector is at a pivotal crossroads, where innovation and sustainability converge to redefine future possibilities. Advanced technologies, especially Artificial Intelligence (AI), are playing a transformative role in reshaping energy systems, driving efficiency, and addressing critical challenges.

## AI-Driven Energy Transformation: By the Numbers

AI's rapid integration into the energy sector comes with notable advancements and significant energy implications. According to recent studies, global data center electricity demand is projected to more than double between 2022 and 2026, exceeding 1,000 terawatt-hours (TWh)—equivalent to Japan's annual electricity consumption. Similarly, AI-specific energy needs are expected to grow tenfold during this period, fueled by the proliferation of data-intensive applications such as generative AI training.

In Northern Virginia's "Data Center Alley," AI data centers already consume 25% of regional electricity. This figure could climb to nearly 50% by 2030, showcasing the immense pressure AI places on local energy grids. In Ireland, data center consumption is expected to reach 32% of national electricity use by 2026, outpacing urban residential demands.

## Scenarios Shaping Energy Futures

A system dynamics approach highlights four scenarios that illustrate potential trajectories for energy sustainability:

**Sustainable AI:** Efficiency improvements in hardware and algorithms reduce energy intensity, with AI electricity demand growing from 100 TWh in 2025 to 785 TWh by 2035. The adoption of renewable energy sources mitigates environmental impacts while supporting the growing needs of AI systems.

**Limits to Growth:** Constrained by material

scarcity and regulatory challenges, AI's energy consumption rises modestly from 510 TWh in 2030 to 570 TWh by 2035. However, these limitations hinder AI's potential to scale sustainably, highlighting the risks of inadequate infrastructure planning.



**Abundance Without Boundaries:** Unchecked AI growth drives electricity demand to 1,370 TWh by 2035, exacerbating resource depletion and environmental strain. This trajectory underscores the need for robust governance to prevent unsustainable development.

**Energy Crisis:** Rapid AI expansion without sufficient infrastructure could cause localized energy shortages. For example, peak consumption in this scenario reaches 670 TWh

before plummeting to 190 TWh by 2035 due to systemic disruptions.

### AI as a Catalyst for Renewable Integration

While AI poses challenges, it also offers solutions that enhance energy system sustainability. By optimizing grid operations and integrating distributed energy resources, AI facilitates the transition to renewable energy. Predictive analytics improve grid stability, while demand-side management ensures efficient energy



usage. In microgrids, AI-driven algorithms enable real-time adjustments, maximizing renewable energy utilization and minimizing waste.

### Technological Advancements Driving Change

Efficiency breakthroughs in AI hardware are pivotal. Innovations such as liquid cooling systems, enhanced GPU architectures, and energy-efficient algorithms are reducing the

energy footprint of AI systems. For instance, next-generation GPUs offer up to a 30x improvement in performance for AI workloads compared to previous models, enabling more sustainable operations at scale.

Simultaneously, the rise of smaller, specialized AI models—such as Small Language Models (SLMs)—reduces computational demands while maintaining effectiveness. By leveraging advancements in both hardware and software, the energy sector can harness AI's capabilities without compromising on sustainability.

### Policy and Industry Collaboration: A Call to Action

Achieving energy sustainability requires concerted efforts across multiple stakeholders. Policymakers must establish standards for sustainable AI practices, incentivize renewable energy adoption, and regulate energy-intensive activities. Industry leaders should prioritize investment in energy-efficient technologies and embrace collaborative initiatives that promote open-source solutions.

Moreover, integrating sustainability assessments into AI development can ensure accountability. Companies that adopt transparent reporting on AI's energy impacts can foster trust and align with global decarbonization goals.

### Charting the Path Forward

The future of energy sustainability hinges on our ability to balance innovation with responsibility. AI, as a general-purpose technology, holds the promise of transforming the energy sector. Yet, its success depends on strategic actions to mitigate its environmental footprint and align its growth with sustainable practices.

By embracing energy-efficient technologies, fostering policy alignment, and prioritizing renewable integration, the energy sector can lead the charge toward a greener, more resilient future. As the world faces mounting energy challenges, the path forward is clear: innovation must serve both progress and the planet.

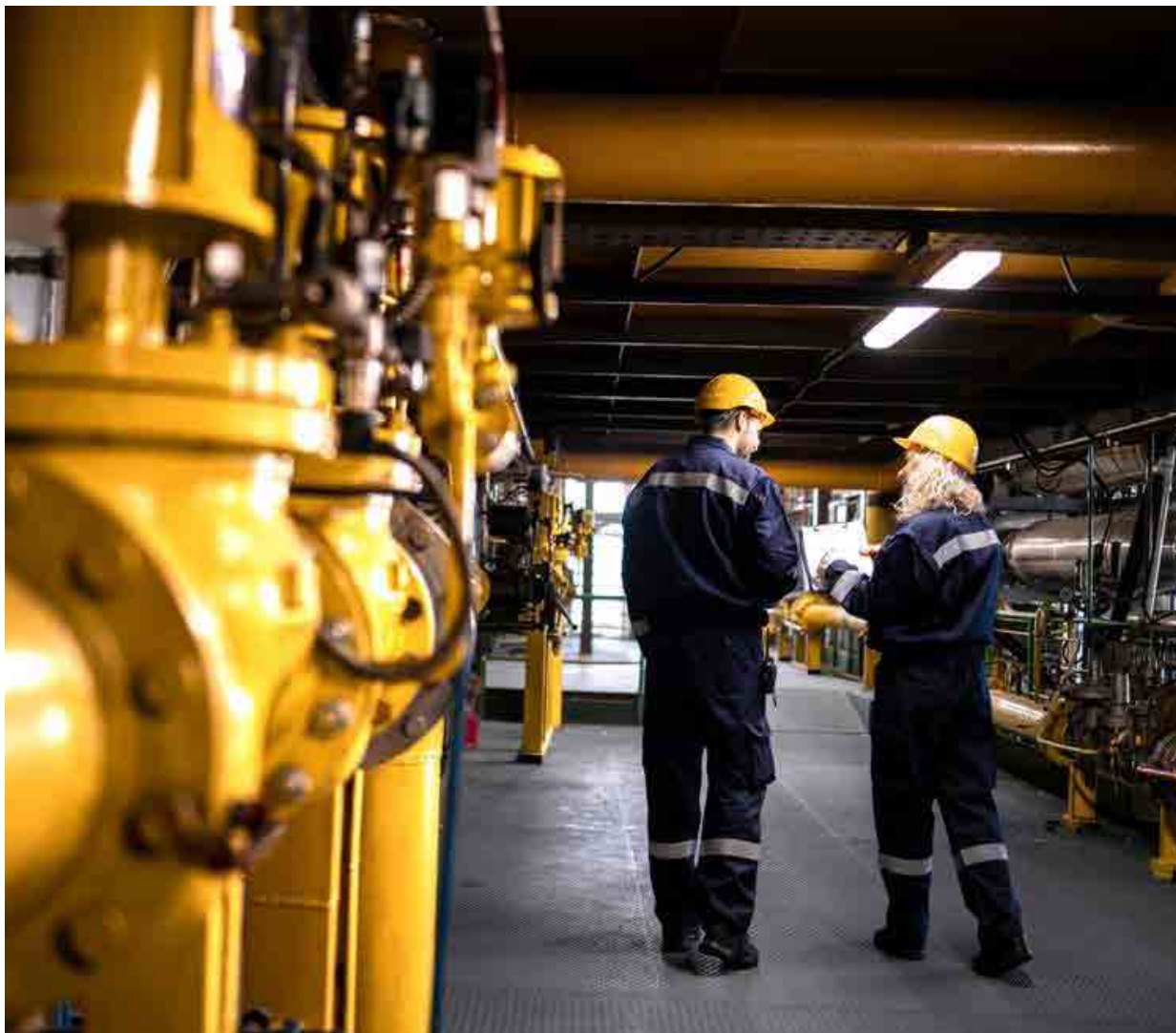
By energyHQ Staff

## Oil & Gas

### 13 *The Workforce of the Future*



# Navigating the Future: Transforming the Oil & Gas Workforce for a New Era



The oil and gas industry is experiencing transformative changes driven by technological advancements, sustainability concerns, and evolving workforce demands. As the sector navigates these shifts, the workforce of the future will need to adapt by embracing new skills, leveraging cutting-edge technologies, and fostering greater diversity.

## **Technological Integration: A New Era of Workforce Efficiency**

Automation and digital technologies are reshaping the oil and gas sector, enabling companies to streamline operations and

enhance productivity. According to recent reports, 73% of oil and gas companies are investing in AI and automation technologies to improve efficiency and reduce operational costs. The increased use of AI, robotics, and data analytics in exploration, drilling, and production processes is revolutionizing how the industry operates, requiring workers with a deep understanding of digital tools.

For instance, predictive maintenance, driven by AI and IoT sensors, has already reduced downtime by up to 30% in some operations. However, the rise of these technologies also

means that traditional roles will evolve. The industry needs a workforce skilled in machine learning, cybersecurity, and data science, with an estimated 60% of new hires required to have advanced digital capabilities. This shift signifies the growing importance of reskilling and upskilling in the workforce.

### **Reskilling and Upskilling: Meeting the Demand for New Skills**

The oil and gas industry's future workforce will be shaped by the need for continuous learning. With the rapid pace of technological change, companies must invest in reskilling initiatives to help workers stay relevant. According to a recent survey, 58% of oil and gas executives stated that they are prioritizing workforce development, with a particular focus on equipping employees with digital skills.

Training programs aimed at developing competencies in AI, data analytics, and digital solutions are already being implemented across the industry. In fact, oil and gas companies are investing \$1 billion annually in training and development programs to ensure their workforce can handle new technologies. These initiatives focus not only on technical skills but also on soft skills like critical thinking, communication, and creativity, which are essential for adapting to an increasingly complex work environment.

### **Diversity and Inclusion: A Future-Oriented Workforce**

Another crucial aspect of the oil and gas workforce transformation is the push for greater diversity. Historically, the industry has been dominated by men, but this is changing as companies recognize the benefits of diverse perspectives. Research shows that companies with more gender-diverse teams are 25% more likely to achieve above-average profitability. The oil and gas sector is taking significant steps to attract and retain women, with 20% of new hires now coming from

underrepresented groups.

To foster inclusion, companies are introducing mentorship programs, diversity-focused recruitment initiatives, and leadership development pathways for women and minorities. The goal is to create a more balanced and innovative workforce, one that can tackle the industry's most pressing challenges with fresh ideas and collaborative approaches.

### **Sustainability and the Shift to a Low-Carbon Future**

Environmental concerns are driving the transition towards a low-carbon future in the oil and gas sector. The International Energy Agency (IEA) estimates that 45% of global emissions reductions needed to meet climate goals by 2030 will come from technologies deployed in the oil and gas industry. This places the responsibility for environmental stewardship squarely on the shoulders of the future workforce.

The shift toward cleaner energy solutions means the workforce must embrace sustainability. A report from the World Economic Forum reveals that 65% of oil and gas executives believe the industry's transition to renewable energy is critical for its long-term survival. As such, oil and gas companies are actively recruiting individuals with expertise in renewable energy, carbon capture, and environmental management. These professionals will play a vital role in reducing emissions and integrating alternative energy sources into traditional oil and gas operations.

In response, oil and gas companies are investing in carbon capture and storage (CCS) technologies, with \$10 billion allocated for CCS projects by 2030. These technologies not only promise to reduce carbon footprints but also require a workforce with specialized training in energy efficiency and environmental science.

**By energyHQ Staff**



# Nuclear

## 16 *The Fukushima Legacy & Lessons Learned*



# Fukushima's Impact on Energy Resilience

The Fukushima Daiichi nuclear disaster of March 11, 2011, remains one of the most significant energy-related incidents in modern history. Triggered by a magnitude 9.0 earthquake and a subsequent tsunami, the catastrophe highlighted critical vulnerabilities in nuclear energy systems. As the global energy industry pivots toward sustainable and resilient solutions, the legacy of Fukushima offers valuable lessons for businesses and policymakers.

\$76 billion and could extend into the 2050s. The Japanese government allocated over \$200 billion in disaster recovery efforts, including compensation for affected individuals and businesses.

## Key Lessons for the Energy Industry

### Prioritizing Risk Assessment and Management

The Fukushima disaster underscored the importance of robust risk assessments. Before



## The Aftermath: By the Numbers

The disaster led to a triple meltdown, releasing approximately 940 petabecquerels of radioactive material into the environment—about 10% of the radiation released during the Chernobyl disaster of 1986. Over 150,000 residents were evacuated, many permanently displaced due to long-term contamination concerns.

Economically, the impact has been staggering. The cleanup operation, managed by the Tokyo Electric Power Company (TEPCO), is expected to cost around

the incident, the Fukushima Daiichi plant was not designed to withstand a tsunami of the magnitude that struck in 2011. This oversight emphasizes the need for energy companies to integrate advanced predictive models and scenario planning into their operations.

### Strengthening Safety Standards

Post-Fukushima, international bodies like the International Atomic Energy Agency (IAEA) revised safety guidelines. Japan implemented the "New Regulatory Requirements for Nuclear

Power Plants,” mandating measures such as higher seawalls, multiple backup power sources, and advanced cooling systems. Businesses in the nuclear sector must view safety upgrades not as regulatory burdens but as strategic investments.

### **Diversifying Energy Portfolios**

The disaster led Japan to temporarily shut down all 54 nuclear reactors, reducing nuclear power’s share in the country’s energy mix from 30% to less than 5%. This void was filled by fossil fuels, increasing Japan’s carbon emissions by 13% between 2011 and 2013. Energy companies



worldwide now emphasize diversification, including renewable sources like wind, solar, and hydroelectric power, to mitigate similar risks.

### **Focusing on Innovation and Resilience**

Technological advancements have been pivotal in addressing Fukushima’s aftermath. Robots and AI-driven systems are integral to radiation monitoring and decontamination efforts. For companies in the energy industry, investing in innovation is essential for operational resilience

and long-term sustainability.

## **Opportunities for the Energy Sector**

### **Decommissioning and Cleanup**

Globally, decommissioning nuclear plants is an expanding market. The Fukushima cleanup operation employs advanced technologies such as remote-controlled robots and AI for debris removal and waste management. Companies specializing in robotics, waste containment, and environmental remediation have lucrative opportunities to partner with governments and operators.

### **Investing in Renewable Energy**

Fukushima Prefecture aims to become 100% renewable by 2040, showcasing a regional shift toward green energy. Companies can capitalize on this trend by providing solutions such as photovoltaic systems, wind turbines, and energy storage technologies.

### **Enhancing International Collaboration**

The disaster spurred global collaborations, including research projects to improve nuclear safety and international sharing of best practices. Firms offering consultancy or technology solutions can tap into partnerships aimed at bolstering energy security and sustainability.

### **The Future of Nuclear Energy**

While the Fukushima disaster cast a shadow over nuclear energy, it also ignited debates about its role in a carbon-neutral future. The IAEA estimates that global nuclear capacity must double by 2050 to meet net-zero targets. Advanced reactor designs, such as small modular reactors (SMRs), promise enhanced safety and lower costs, providing opportunities for investment and innovation.

Fukushima’s legacy is a stark reminder of the inherent risks in energy production, yet it also serves as a catalyst for change. The lessons learned have reshaped safety protocols, spurred technological innovation, and driven diversification efforts. For energy companies, embracing these lessons is not just about preventing disasters but also about positioning themselves as leaders in a rapidly evolving energy landscape. The future belongs to those who can balance safety, sustainability, and innovation—key pillars for navigating the complexities of the modern energy industry.

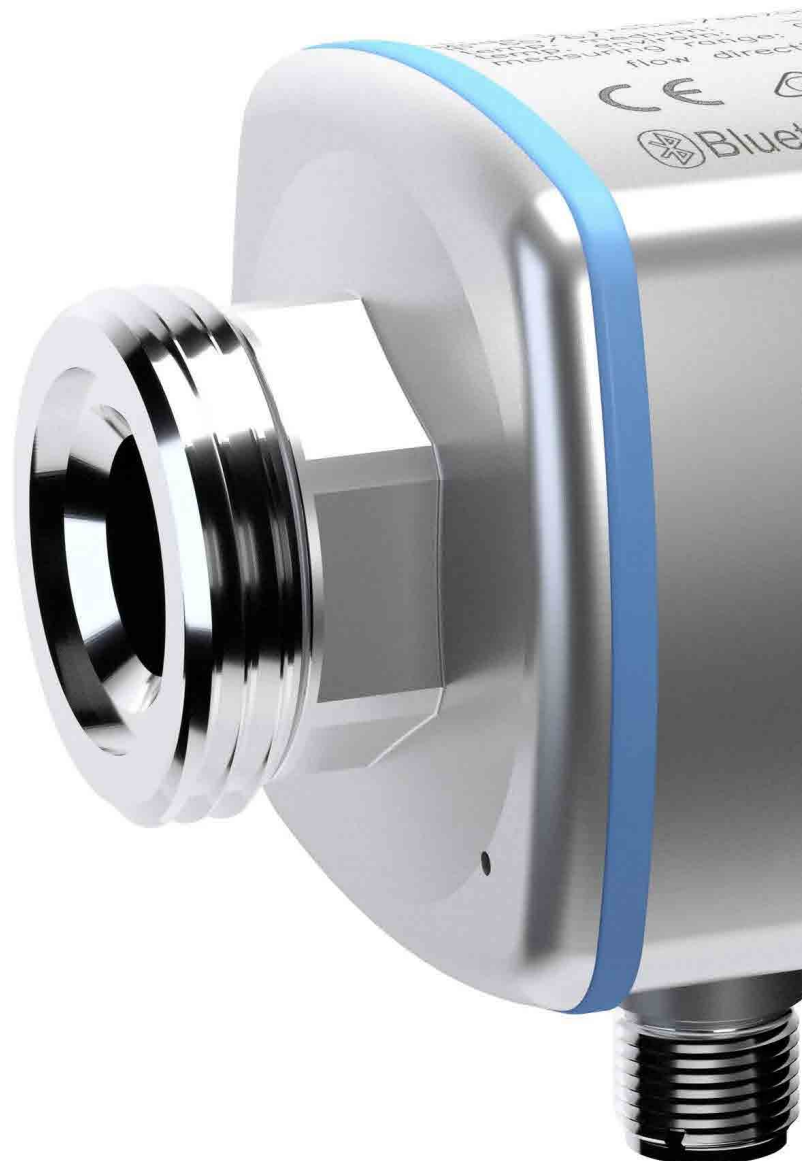
**By energyHQ Staff**

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## Endress + Hauser Picomag DN50 2 in. BSPP Electromagnetic Flow Meter

The Picomag is a compact and economical electromagnetic flow meter designed for measuring conductive liquids in various industries. Its small size and flexible installation make it ideal for tight spaces and skid applications.

Picomag goes beyond simple flow measurement with built-in temperature and conductivity sensors, providing valuable data for process monitoring and control. Configuration and operation are made easy through a secure Bluetooth connection and the intuitive SmartBlue app on your smartphone or tablet.



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# Hydrogen

*21 Innovations & Emerging Technologies*



**H<sub>2</sub>**  
**HYDROGEN**

# Hydrogen Energy Revolution: Nikola's Innovations and PureWave's Game-Changer



The hydrogen sector is undergoing transformative advancements through two key players: Nikola Corporation and PureWave Hydrogen. Nikola is redefining zero-emission transportation with its hydrogen fuel cell technology, while PureWave is revolutionizing hydrogen production through innovative and cost-efficient solutions. Together, these breakthroughs position hydrogen as a critical driver of global decarbonization.

## **Nikola and FEF: Setting a New Standard for Hydrogen Transportation**

The world's first hydrogen fueling station for commercial trucks, developed by FirstElement Fuel (FEF), recently opened near the Port of Oakland. This station has a fueling capacity over ten times greater than existing hydrogen stations, serving Nikola's hydrogen fuel cell electric trucks under a 10-year agreement.

In December 2023, Nikola named FEF an authorized Nikola Fueling Solutions Partner,

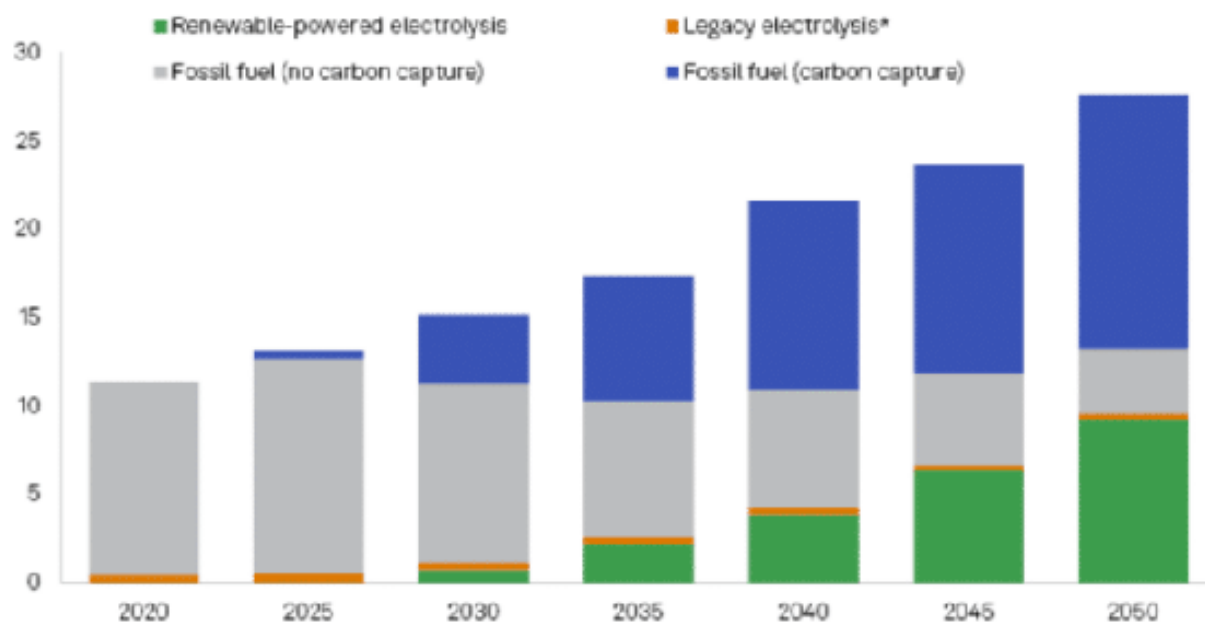
ensuring access to advanced refueling services like the H70 fast-fill lane, which enables hydrogen refueling in just 10 minutes. This station, funded by the California Energy Commission's NorCal Zero Project, can serve up to 200 trucks daily.

Joel Ewanick, FEF's executive chairman, highlighted the importance of this collaboration, stating:

"This partnership showcases our commitment to transforming transportation and supporting Nikola's hydrogen fuel cell electric trucks."

Nikola's hydrogen fuel cell trucks represent a significant step in decarbonizing the trucking industry. The Oakland station, part of a broader effort to establish a U.S. hydrogen infrastructure, aligns with federal funding of \$8 billion for hydrogen development, including plans for 60 additional stations across California.

## US hydrogen supply by production method (MMt)



As of July 1, 2024.

\* Electrolysis projects with a non-dedicated power source, such as a chloralkali plant that produces hydrogen as a byproduct.

Source: S&P Global. Commodity Insights Global hydrogen outlook to 2050.

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sources remains a challenge.

### PureWave and the University of Wyoming: Redefining Hydrogen Production

PureWave Hydrogen Corporation is making strides in hydrogen production through a partnership with the University of Wyoming's Hydrogen Energy Research Center (H2ERC). This collaboration focuses on advancing geologic hydrogen containment technology using synthetic clay suspension, a patent-pending innovation developed by Dr. Saman Aryana's team.

PureWave specializes in exploring naturally occurring "white" hydrogen, a clean and energy-efficient alternative. The company's partnership with H2ERC provides access to cutting-edge containment technologies that enhance hydrogen storage while minimizing environmental impact.

### Advancing Natural Hydrogen Solutions

PureWave's focus on naturally occurring hydrogen aligns with growing global energy demands. By leveraging Wyoming's abundant resources, the company aims to establish the state as a hub for hydrogen production. H2ERC supports this mission by exploring geologic storage methods and collaborating

- Improved Containment: Reduces hydrogen molecule escape, enabling efficient storage in geological formations.
- Versatility: Applicable to vertical and horizontal wells.
- Environmental Safety: Ensures secure containment with minimal ecological impact.

Cat Campbell, PureWave's Head of Geoscience, emphasized:

"This agreement advances our mission to develop safe, sustainable hydrogen containment technologies."

### Transforming the Hydrogen Economy

Through innovations in transportation and production, Nikola and PureWave are shaping a greener future. Nikola's fuel cell technology promotes zero-emission trucking, while PureWave's efficient production methods make scalable hydrogen energy a reality. Together, their efforts highlight hydrogen's pivotal role in global decarbonization and the transition to a sustainable energy landscape.

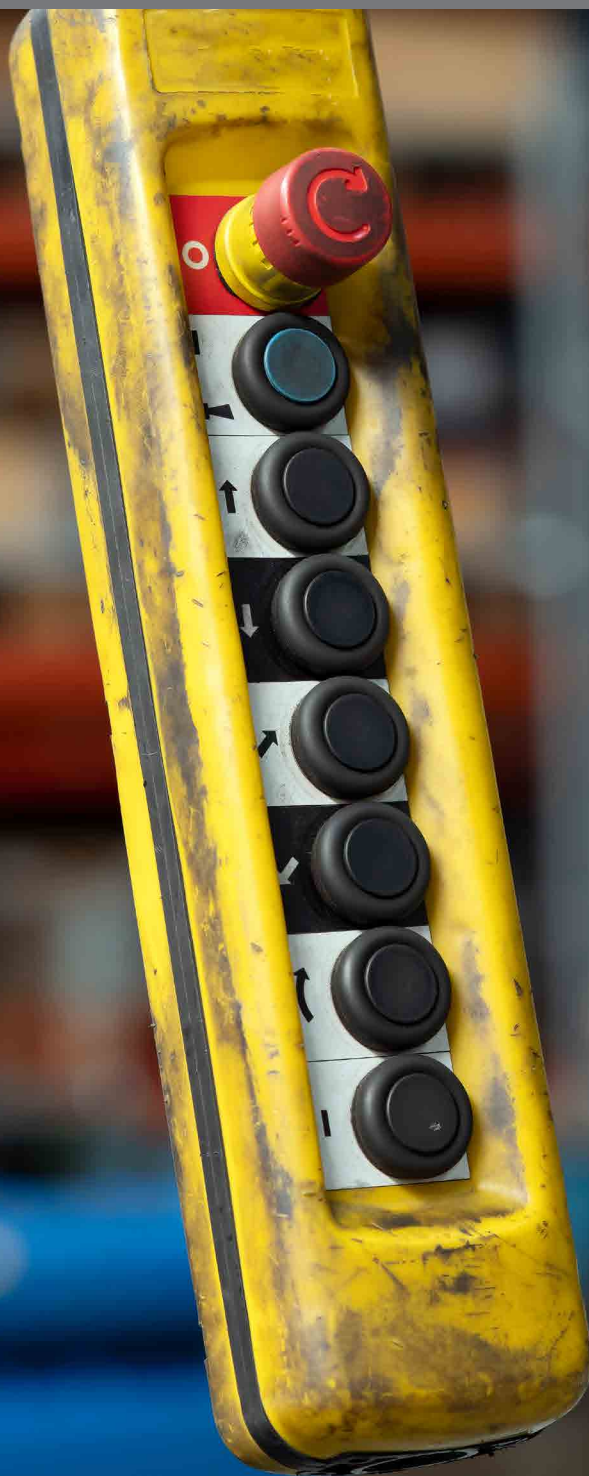
By Jennifer L

<https://carboncredits.com/>



# Cover Story

*24 Energy Compliance Solutions*



## RiConnect Appoints Electro7 in Middle East

RiConnect Inc., a provider of cloud-based Software as a Service (SaaS), has named Electro7 General Trading LLC a distributor in the Middle East.

The partnership was welcomed by attendees at the recent ADIPEC Exhibition & Conference, which took place in Abu Dhabi, UAE.

Electro7 will supply RiConnect's full SaaS offering to large-scale industrial and commercial businesses, including companies in the energy, construction, and logistics sectors, across key regions, such as the UAE, Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and Pakistan. Electro7 Group was founded in 2003 with a singular mission to revolutionise

needs with precision and agility."

Electro7 continues to build around the cornerstones of global partnerships, innovative solutions, and brand recognition. It collaborates with leading manufacturers to deliver world-class products; develops bespoke services that solve complex challenges across sectors; and earns trust and accolades from industry pioneers in quality and reliability. The company holds certifications from esteemed global authorities, including ISO 9001, ISO 14001, and ISO 45001.

"Our success story is a testament to our unwavering commitment to our clients and their evolving needs," added Sikander.

# RiConnect Connect to S

the trading and supply industry with cutting-edge solutions and unmatched service. From its inception, the company has consistently evolved to meet the dynamic demands of a global marketplace.

Farhan Sikander, managing director at Electro7, said: "The heart of Electro7 lies in its people. Currently with about 32 employees from four different nationalities, we are providing services to both the government and private sector. Our diverse team comprises a growing number of professionals who are not just employees but visionaries working together to deliver excellence. Their expertise spans industries, enabling us to adapt to client

"We embody a legacy of trust, innovation, and progress. Our client-centric approach, combined with our dedication to sustainability and emerging technologies, ensures we remain a partner of choice for businesses worldwide. We are more than a trading company; we are architects of solutions that shape industries and empower success."

### **Safety, compliance, and traceability**

RiConnect is dedicated to simplifying and digitalising the processes around compliance and traceability for equipment management. It has pioneered utilisation of radio frequency identification (RFID) chips, allowing end users

of lifting and other equipment to keep up with pre-use checks and unique identification numbers. By moving to paperless systems, companies can improve the accuracy of maintenance, safety checks, incident reports, and regulatory compliance, while ensuring seamless information sharing.

Sikander said: “We became aware of RiConnect through industry events and our existing network. Their reputation and expertise in compliance-focused SaaS solutions aligned with our commitment to providing value-added services to our clients. RiConnect enhances traceability and safety compliance in supply chains, which is crucial for improving efficiency, reducing risks, and meeting regulatory requirements, especially in sectors with strict standards. The oil and gas

with critical entry points into the wider energy sector, particularly within markets where safety and regulatory compliance are top priorities.”

Sikander said: “Safety, compliance, and traceability are increasingly essential as regulatory standards tighten across various industries. Clients need robust solutions to track products from origin to destination. The energy, construction, manufacturing, and logistics sectors in the Middle East will especially benefit from these solutions due to their need for compliance, safety, and reliability. It was great to catch up with the RiConnect team [at ADIPEC]. It helped us align our strategies and discuss new developments that could benefit our customers.”

### Global nexus

“ADIPEC was a resounding success,” said Whitehurst-Maiden. “Over four days, we gathered nearly 350 high-quality leads, underscoring the demand for digital solutions in the oil and gas sector. Our participation reinforced RiConnect’s standing as a leader in traceability and asset tracking. This level of engagement shows that the industry is moving toward compliance-focused digital solutions, validating our position and value proposition.”

Based in Dubai, UAE — a global nexus for innovation and trade — Electro7 leverages its strategic location to connect with clients and suppliers worldwide. This central positioning allows it to remain at the forefront of emerging markets and technologies. Recruitment efforts are ongoing to fill roles in business development, technical engineering, and supply chain management.

RiConnect has delivered comprehensive software training to existing Electro7 employees and will provide ongoing guidance on best practices for digital safety, asset management, and customer service. This latest appointment represents continued expansion of RiConnect’s global network, with subsidiaries in the UK and US; and existing partners located in Hong Kong, Iceland, Malaysia, Singapore, Taiwan, and the UK.

**RiConnect Inc.**

# ect safety

industry is central to our business, reflecting our capability to meet the rigorous demands of this vital market.”

Rob Whitehurst-Maiden, sales manager at RiConnect UK Limited, said: “Our business model emphasises building a strong network of regional agents, which allows us to cultivate a RiConnect ecosystem where partners can thrive. This strategy ensures localised support and expertise, allowing RiConnect to expand globally, while maintaining a tailored approach in each market.”

He added: “Electro7 is established in the strategically important Middle Eastern oil and gas industry. The partnership provides us

# Energy Storage & Grids

27 *The Human Factor & Community Engagement*



# Enhancing Energy Success: The Human Factor and Community Engagement in Sustainable Development



In the rapidly evolving energy sector, the integration of human factors and active community engagement has become pivotal for the successful deployment of energy infrastructure projects. Recognizing and addressing the human element not only facilitates smoother project implementation but also fosters public trust and acceptance, which are essential for the industry's sustainable growth.

## The Imperative of Community Engagement

Public engagement in energy infrastructure is increasingly crucial as opposition to projects like wind farms and electricity grids can impede progress toward climate and energy objectives. Meaningful public participation allows communities to express concerns and opinions about technologies and their

placement, leading to improved decision quality and legitimacy. It also enhances transparency in decision-making, resulting in better-informed outcomes that align with public needs. Furthermore, effective engagement can reduce delays in permitting and construction, diminish opposition, and build trust between project developers and the community.

## Quantifying the Impact

Recent data underscores the significance of community engagement:

**Renewable Energy Growth:** In the first nine months of 2024, utility-scale solar and wind capacity additions accounted for nearly 90% of all new generation sources, a substantial increase from 57% during the same period in 2023. This surge reflects growing public and



private investment in clean energy, setting the stage for continued expansion.

**Solar Capacity Expansion:** Solar energy was the only primary generation source to record capacity growth in 2024, with an 88% increase to 18.6 gigawatts (GW). Consequently, solar surpassed hydropower and nuclear to become the fourth-largest source of installed capacity, following wind.

**Wind Generation Milestone:** Despite a 14% decline in capacity additions to 2.6 GW due to supply chain, financing, and permitting challenges, wind generation reached a new record by exceeding coal-fired generation for two consecutive months for the first time.

**Battery Storage Growth:** Battery storage accounted for the second-largest share of total generating capacity additions, rising by 64% to 7.4 GW. Excess wind and solar generation is the third-largest use case for batteries, following arbitrage and frequency regulation.

### **The Role of Human Factors in Project Success**

Understanding human factors extends beyond community engagement to include the workforce within the energy sector. For

instance, the nuclear energy industry in the U.S. is facing critical challenges due to a declining number of nuclear engineering graduates and an aging workforce. From 2012 to 2022, graduates fell by 25%, with merely 454 students in 2022. The current demographic shows 17% of nuclear workers over 55, causing concerns as the demand for nuclear energy rises. To support this growth, the U.S. nuclear workforce needs to expand from about 68,000 to over 200,000.

Integrating human factors and community engagement into energy infrastructure projects is not merely a regulatory obligation but a strategic advantage. By prioritizing these elements, energy companies can achieve more efficient project implementation, enhanced public acceptance, and contribute to the broader goals of a just and inclusive energy transition. As the industry continues to evolve, those who effectively engage with communities and address human factors will be better positioned to lead in the global energy landscape.

**By energyHQ Staff**

# Country Reports

30 KSA

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# Saudi Arabia's \$1.5 Billion Solar Thermal Project: Pioneering Green Manufacturing and Decarbonization



## GlassPoint and Ma'aden Lead a Transformative Sustainability Initiative

Saudi Arabia is advancing its commitment to industrial sustainability and carbon reduction with the launch of a \$1.5 billion solar thermal project, spearheaded by GlassPoint in collaboration with Ma'aden and the Saudi Ministry of Investment (MISA). This groundbreaking venture, the largest industrial solar thermal initiative globally, is designed to decarbonize the aluminum supply chain while reinforcing the goals of Saudi Vision 2030.

### Revolutionizing Solar Thermal Technology

At the core of the project is the GlassPoint Ma'aden Technology Showcase (GMTS), which highlights cutting-edge advancements in solar-to-heat solutions. Key innovations, such as anticlastic polymer membranes and high-performance niobium mirrors, have achieved remarkable cost reductions—lowering solar field expenses by 30% and thermal storage costs by 50%. These advancements offer businesses a viable pathway toward cost-efficient decarbonization in industrial operations.

The project's solar thermal system will supply 65% of the steam required by Ma'aden's bauxite refinery in Ras Al Khair, slashing annual carbon emissions by approximately 600,000 tons. GlassPoint's scalable technology reduces heat-related emissions by up to 70%, providing a sustainable alternative to gas-powered systems while maintaining cost competitiveness. This initiative aligns with Saudi Arabia's strategic vision of decreasing reliance on fossil fuels and achieving net-zero carbon emissions by 2060.

Economic Growth and Workforce Development

The project also marks a significant milestone

in economic diversification. A new solar manufacturing facility is being established in Saudi Arabia, which is expected to create over 200 green jobs. This facility will support the Ma'aden initiative while also producing renewable energy components for the Gulf Cooperation Council (GCC), North Africa, and Southern Europe markets.

By developing a localized supply chain for solar thermal technology, Saudi Arabia is positioning itself as a regional leader in concentrated solar power (CSP) solutions. This move supports both the Saudi Vision 2030 objectives and the Saudi Green Initiative, further integrating sustainable practices into the kingdom's industrial ecosystem.

### Addressing Global Decarbonization Challenges

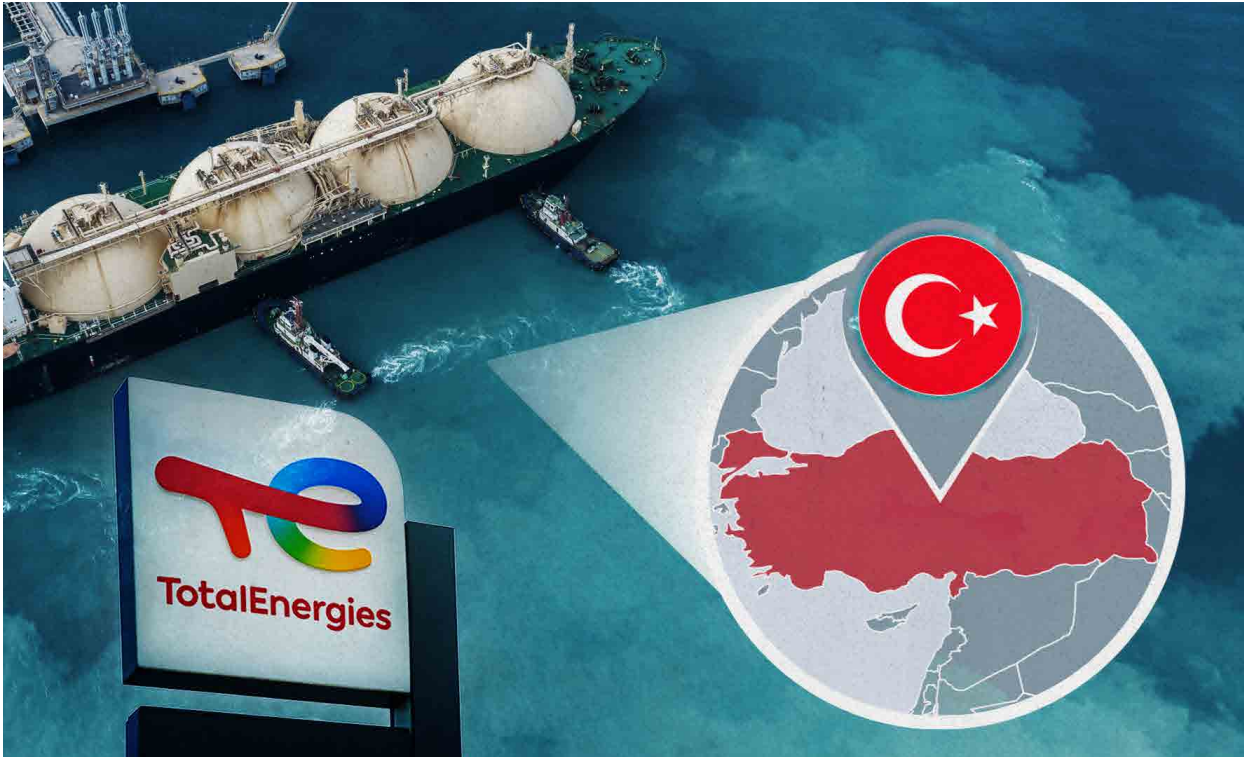
With a focus on the \$444 billion global industrial process heat market, the Ma'aden I project aims to address one of the sector's most pressing challenges: decarbonization. The flexibility of GlassPoint's technology allows for integration with alternative heat sources, including biomass, hydrogen, and electricity. This adaptability ensures seamless alignment with evolving industrial energy demands.

By showcasing how solar thermal technology can complement and enhance existing industrial processes, this initiative sets a precedent for sustainable energy solutions in manufacturing and beyond. For businesses in the energy industry, the Ma'aden I project demonstrates the potential of renewable energy to revolutionize industrial heat applications while contributing to global sustainability goals.

By energyHQ Staff



# Türkiye's LNG Supply Mix: Redefining Energy Security and Sustainability



Türkiye is rapidly transforming its energy landscape by diversifying its energy sources, enhancing infrastructure, and securing long-term liquefied natural gas (LNG) agreements. These efforts aim to address global decarbonization goals, bolster energy security, and reduce dependency on pipeline imports from countries like Russia and Iran.

## Diversifying LNG Sources

Türkiye has secured significant LNG agreements with global energy giants such as TotalEnergies, Shell, and ExxonMobil. These contracts, which guarantee over 8.8 billion cubic meters (bcm) of LNG annually starting from 2027, mark a strategic shift away from reliance on pipeline gas. This diversification reduces Türkiye's vulnerability to geopolitical risks and supply interruptions, while positioning the country as a flexible energy player in the region.

## Infrastructure Advancements

To support its growing LNG imports, Türkiye has invested in Floating Storage and Regasification Units (FSRUs), strategically located across the country. With three operational FSRUs, including the flagship Ertuğrul Gazi, and five LNG import

terminals, Türkiye's annual gas import capacity now exceeds 75 bcm—well above its domestic consumption of approximately 50 bcm. These facilities allow Türkiye to adjust import volumes seasonally, with the capability to handle up to six LNG shipments per month during peak winter demand.

## Becoming a Regional Energy Hub

Türkiye's LNG strategy also enhances its regional influence. Its infrastructure investments, such as upgrades to the Trans-Balkan pipeline, enable LNG re-exports to Europe, meeting growing demand in Southeast Europe. By integrating LNG supplies from diverse sources and fostering partnerships, Türkiye aims to create a "Turkish Blend" of gases, solidifying its role as a major energy hub.

By balancing LNG as a transitional fuel with investments in renewable energy, Türkiye is advancing its sustainability goals while securing its energy future. This dual approach not only strengthens Türkiye's energy independence but also enhances its position in the global energy market.

By energyHQ Staff

# Canadian Energy Sector Eyes Growth Despite Tariff Concerns



*Trump's tariff threat challenges Canada's oil and gas employment surge, poised for its best year in a decade*

Canada's oil and gas well drilling sector expects its strongest job growth in a decade next year, but concerns loom over potential impacts from US president-elect Donald Trump's proposed tariffs. Trump recently threatened 25% tariffs on imports from Canada and Mexico, which the Canadian Association of Energy Contractors (CAOEC) warns could disrupt the energy industry.

CAOEC president and CEO Mark Scholz described these tariffs as a "serious issue," emphasizing the need for collaboration. "Let's set politics aside and get to work because we have a serious issue at hand," Scholz said at an event in Calgary. While the CAOEC has yet to calculate the financial effects, Scholz acknowledged that such tariffs could impact employment, potentially raising energy costs for US consumers.

Despite these concerns, Canada's energy sector is thriving. The CAOEC projects 6,604 wells will be drilled in Western Canada in 2025—a 7.3% increase over 2024 and the highest level since the 2014-15 commodity price crash. Employment is also expected to rise by 7% year-over-year, reaching 41,800 jobs. Scholz highlighted these

as "mortgage-paying, blue-collar jobs that build strong communities."

The sector faces additional challenges from domestic policies, including greenhouse gas caps, federal impact assessments, and anti-greenwashing legislation. Critics argue these measures act as de facto production caps, potentially disadvantaging Canada against US competition.

To address these issues, Scholz called for a united approach. He urged Canada to communicate the tariffs' broader implications, including higher energy prices for Americans, to US stakeholders. Scholz also expressed support for Prime Minister Justin Trudeau's "Team Canada" strategy, emphasizing cooperation between federal and provincial leaders.

"We're going to support the Prime Minister, the premiers ... it's important that we get this right," Scholz concluded.

**By Freschia Gonzales**

[www.wealthprofessional.ca/](http://www.wealthprofessional.ca/)

# Services

*34 Coming Events*



## Coming Events

### International Conference on Sustainable Energy and Green Technology 2024

Millennium Hilton Bangkok, Bangkok, Thailand  
15 - 18 Dec 2024

<https://www.isegt.org/>

The focus of the International Conference on Sustainable Energy and Green Technology is to advance research and technology in sustainable energy, encompassing renewable energy...

### Saudi Arabia Smart Grid Conference 2024

The Ritz-Carlton Riyadh, Riyadh, Saudi Arabia  
16 - 18 Dec 2024

<https://saudi-sg.com/>

Smart Grid Insights™ provides a succinct overview of the latest advancements shaping the smart grid landscape. Covering renewable energy integration, AI, blockchain...

### Chinese Renewable Energy Conference & Exhibition 2024

Wuxi Taihu International Expo Center, Wuxi, China  
18 - 20 Dec 2024

<http://www.crecexpo.com/>

Chinese Renewable Energy Conference & Exhibition will focus on hot topics, focusing on the application and promotion of new energy sources such as photovoltaics, energy storage, wind power...

### Shanghai International Energy Storage and Battery Industry Exhibition 2024

18 - 20 Dec 2024  
Shanghai, China

<https://www.es-shanghai.com/ES/idx/eng>

The upcoming Shanghai International Energy Storage and Battery Industry Exhibition will highlight energy storage technology applications in electricity, transportation, and industry...

### Renewable & Sustainable Energies and Green Processes Conference 2024

22 - 24 Dec 2024  
Sousse, Tunisia

<https://rsegp-conference.com/>

The Renewable & Sustainable Energies and Green Processes (RSEGP) conference provides a platform for exchanging knowledge on energy and environmental science...

### International Conference on Solar Power Technology 2025

03 - 04 Jan 2025  
Dubai, UAE

<https://itrgroup.net/Conference/1356/ICSPT/>

International Conference on Solar Power Technology aims to bring together leading academic scientists, researchers and research scholars to exchange and share their experiences...

### Iraq International Energy Expo & Conference 2025

Baghdad International Exhibition, Baghdad, Iraq  
10 - 12 Feb 2025

<https://elec-fair.com/>

In 2025 The 10th Iraq Energy Exhibition & Conference IEE The development the world is witnessing in the field of energy will make the Iraq Energy Exhibition and Conference...

### 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...

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Media Kit 2025	Holistic Promotional Packages (HPP)
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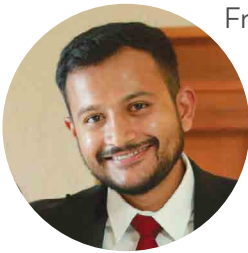
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## Why Energy Firms Are Going All-In On The Green Transition



From the silicon and perovskites used in solar cells to the adhesives, composites and coatings for wind turbines, chemicals are an indispensable – if somewhat overlooked – part of the journey to a cleaner, greener future. The relative lack of attention is surprising because without chemical elements such as lithium, cobalt and nickel – all used in the batteries that power electric vehicles – the energy transition would flounder.

Chemicals' centrality to new forms of power was highlighted on Wednesday when Abu Dhabi-based energy major Adnoc launched XRG, an international lower-carbon energy and chemicals investment company, with an enterprise value exceeding \$80 billion. Adnoc wants XRG's chemicals platform to become a top-five global player, producing and delivering chemical and speciality products to meet a projected 70 per cent increase in global demand by 2050. XRG will start operations in the first quarter of 2025 and will host a global strategy event next year.

This is a significant development that underlines the powerful role major companies are playing when it comes to not only driving the energy transition but making it profitable, too. Adnoc is not alone in this; but it is leading the way. Energy companies have the resources and motivation to come up with ways to make the energy transition work. It is in their interests to do so; developing more sustainable forms of energy is how such businesses will evolve and survive.

In contrast, the struggle to reach consensus seen recently at the Cop29 climate summit in Baku highlights the difficulty in trying to get dozens of governments on the same page. Although delegates eventually made important progress on climate finance and carbon markets, the fact that the talks ran 35 hours beyond their planned finish shows how labour-intensive reaching such agreements can be. As The National argued at the start of Cop29, a multitude of parties are needed to inform the conversation on climate innovations because energy firms understand that they are working with a finite resource.

“The private sector has the resources and motivation to come up with ways to make the energy transition work; it is in their interests to do so

With Adnoc's XRG platform, the company is showing that it is going all-in on the transition to a sustainable future. And while technical expertise and financial investment are key parts of this strategy, people are, too. At Adnoc's annual board meeting on Wednesday presided over by UAE President Sheikh Mohamed, the company's target of directing Dh200 billion (\$54.5 billion) into the UAE economy over the next five years through its In-Country Value programme was endorsed. This programme has also created 5,500 jobs for Emiratis in the private sector this year, adding to the 17,000 employed in the private sector since the programme was launched in 2018.

Such circular economics prove that partnership between the private sector, national governments and wider society is important, beneficial and achievable.

**John Benny** 

<https://www.thenationalnews.com/> 

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