THE ENERGY INDUSTRY TIMES

May 2025 • Volume 18 • No 3 • Published monthly • ISSN 1757-7365 www.teitimes.com

Gearing up for growth

TEI Times catches up with Hitachi Energy's Maxine Ghavi to discuss the key takeaways from WindEurope 2025. *Page 13*

Japan's clean power push

The clean energy revolution in Japan is gathering momentum, and both domestic giants and foreign heavyweights are driving the shift. *Page 14*

Final Word

Junior Isles hears why world leaders are on the same page when it comes to energy security. *Page 16*

News In Brief

EU walks gas tightrope as it weighs up supply options
The European Union is weighing up its options on securing more gas, as it faces pressure from the US to buy more supplies, while pondering how to exit long term gas contracts with Russia. *Page 2*

Landmark New York offshore wind project cancelled
US Interior secretary Doug Burgum has ordered Equinor to halt work on the 810 MW Empire Wind project off the coast of New York City. *Page 4*

Asia outshines Europe and US in energy transition momentum
Asia has already built up a considerable lead over several European countries and the US in terms of energy transition progress so far in 2025. *Page 5*

France makes hydrogen grants but cuts ambition
France has reduced its target for installed electrolyser capacity powered by renewables or nuclear power by 2030 from 6.5 GW to 4.5 GW in a recent national strategy update. *Page 7*

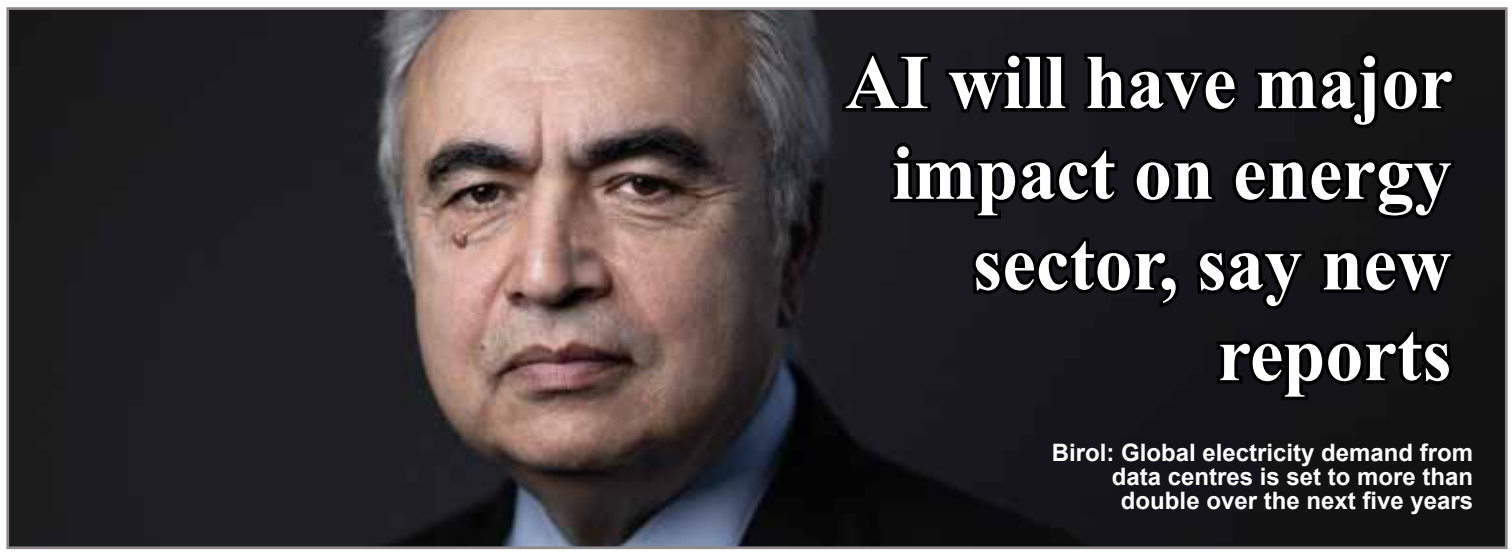
Global nuclear capacity to reach 494 GW by 2035
Advancements in small modular reactor technology and supportive policies for low-carbon baseload power are behind a renewed interest in nuclear power, with capacity forecast to grow from 395 GW in 2024 to 494 GW by 2035. *Page 8*

Siemens Energy delivers strong Q2
Germany's Siemens Energy has delivered a strong second quarter of fiscal year 2025, exceeding market expectations. *Page 9*

Technology Focus: Modular geothermal opens new opportunities
Having demonstrated the ability to convert waste heat from existing oil and gas operations into renewable power without the need for any new drilling, a modular, mobile geothermal system also has the potential to support the fast-growing, power-hungry data centre market. *Page 15*

Advertise
advertising@teitimes.com

Subscribe
subscriptions@teitimes.com
or call +44 (0)1933 392987



AI will have major impact on energy sector, say new reports

Birol: Global electricity demand from data centres is set to more than double over the next five years

The rise of artificial intelligence will impact the energy sector in many ways, increasing electricity demand while transforming the sector itself. **Junior Isles**

Artificial intelligence (AI) is set to drive surging electricity demand from data centres while unlocking significant opportunities to cut costs, enhance competitiveness and reduce emissions, according to a new report by the International Energy Agency (IEA).

The IEA's special report, 'Energy and AI', projects that electricity demand from data centres worldwide is set to more than double by 2030 to around 945 TWh. AI will be the most significant driver of this increase, with electricity demand from AI-optimised data centres projected to more than quadruple by 2030.

In the US, power consumption by data centres is on course to account for almost half of the growth in electricity demand between now and 2030, says the IEA. Driven by AI use, the US economy is set to consume more electricity in 2030 for processing data than for manufacturing all energy-intensive goods combined, including aluminium, steel, cement and chemicals. In advanced economies more broadly, data centres are projected to drive more than 20 per cent of the growth in electricity demand between now and 2030, putting the power sector in those economies back on a growth footing after years of stagnating or declining demand in many of them.

"AI is one of the biggest stories in the energy world today – but until now, policy makers and markets lacked the tools to fully understand the wide-ranging impacts," said IEA Executive Director Fatih Birol. "Global electricity demand from data centres is set to more than double over the next five years, consuming as much electricity by 2030 as the whole of Japan does currently. The effects will be particularly strong in some countries. For example, in the United States, data centres are on course to account for almost half of the growth in electricity demand; in Japan, more than half; and in Malaysia, as much as one-fifth."

While the increase in electricity demand for data centres is set to drive up emissions, this increase will be small in the context of the overall energy sector and could potentially be offset by emissions reductions enabled by AI if adoption of the technology is widespread, according to the report. Additionally, as AI becomes increasingly integral to scientific discovery, the report finds that it could accelerate innovation in energy technologies such as batteries and solar PV.

"With the rise of AI, the energy sector is at the forefront of one of the most important technological revolutions of our time," Dr Birol said. "AI is a tool, potentially an incredibly powerful one, but it is up to us – our societies, governments and companies – how we use it. The IEA will continue to provide the data, analysis and forums for dialogue to help policy makers and other stakeholders navigate the path ahead as the energy sector shapes the future of AI – and AI shapes the future of energy."

Continued on Page 2

World leaders and businesses unite on energy security

A high-level gathering of governments and industry has concluded with shared understanding of a broader and more resilient approach to energy security.

The 'Future of Energy Security Summit' co-hosted by the International Energy Agency (IEA) and the UK government in London last month, saw decision makers from 60 governments and over 50 major energy companies, alongside international institutions and civil society organisations, come together to reassess and reframe energy security in a rapidly transforming world.

Speaking just ahead of the event, IEA Executive Director, Dr Fatih Birol, told the *Financial Times* that there were "three golden rules" for energy security: a diversification of energy supplies, enough political predictability to allow companies to make huge long-term investments, and global co-operation.

Referring to the crisis caused by the loss of Russian pipeline gas from Europe and the rush to source alternative supplies of energy, Dr Birol said he thought the "lessons from Ukraine have not yet been fully understood".

It was clear at the Summit, however, that despite the ongoing geopolitical rifts, all countries agree that having secure and reliable supplies of energy is a top priority, and those supplies are growing more insecure.

"In challenging geopolitical and economic times, this Summit has demonstrated that while the nature of energy security is evolving, the need for international cooperation remains constant," said Dr Birol at the London event. "What emerged from our discussions was not only a shared understanding of the challenges ahead, but a recognition that the solutions – whether technical, political, or financial – will be more effective if pursued together. This Summit has made it clear for the world that we are in a new era of energy security."

The Summit opened with a clear recognition that energy security can no longer be understood solely in terms of traditional risks. While safeguarding oil and gas supplies and maintaining emergency response mechanisms remain critical, participants agreed that the future of energy security must also encompass newer dimensions such as cyber security, extreme weather events, supply chain resilience for critical minerals and clean technologies, and integration of electrified and decentralised systems.

UK Secretary of State for Energy Security and Net Zero Ed Miliband, said. "We have discussed how to drive our collective energy security, and here in the UK we have announced a £300 million boost for offshore wind supply chains through Great British Energy... In a changing and uncertain world, Britain is determined to strengthen our alliances and double down on our commitment to multilateralism."

Natasha Green, Programme Lead, Global Energy Transition, at UK-based energy think-tank E3G, commented: "This summit was touted as a possible lame duck given uncertainties over attendance and hyped tensions over fossil fuels beforehand.

"What happened instead, was the vast majority of countries showing a deep appetite to collaborate on pursuing a secure energy transition and turning to the IEA as a critical analyst and convenor in this endeavour."

THE ENERGY INDUSTRY TIMES is published by Man in Black Media • www.mibmedia.com • Editor-in-Chief: Junior Isles • For all enquiries email: enquiries@teitimes.com

Continued from Page 1

The report emphasises the significant uncertainties that remain, from the macroeconomic outlook to how quickly AI will be adopted. It also notes questions over how capable and productive AI will become, how fast efficiency improvements will occur, and whether bottlenecks in the energy sector can be resolved.

Commenting on the energy demand from data centres and potential bottlenecks, Charlie Morgan, a partner in Herbert Smith Freehills' disputes practice, said: "With electricity demand from data centres set to more than double in the next five years because of AI, the onus is on organisations at every point of the AI supply chain to keep the show on the road. Doing so in an environment riven by uncertainty because of geopolitical concerns and rapid technological advances requires work upfront thinking about what would happen if things go wrong."

Some experts, however, are less concerned about the pressure that AI and data centres will put on energy demand. As the IEA released its report, Energy Intelligence, an independent information company, released its outlook report, 'Energy and Artificial Intelligence'.

According to the report, the widely touted explosion in power demand is overstated, with AI likely to only moderately increase global electricity demand by 2050. Economic growth, industrial electrification and air conditioning, for example, are expected to be of greater significance to global energy demands.

Michael Collins, Director, Energy Transition Research at Energy Intelligence, commented: "Our research indicates that forecasts predicting an explosion in energy demand due to AI are likely to be overstated. While we may see increases in the short-term, efficiencies in AI hardware and software, and the benefits the technology will bring to the power sector, will likely be significant mitigation."

In the short-term, as AI's rollout expands, demand from data centres is estimated to reach 1000 TWh by 2026 from 460 TWh in 2022, an increase of around117 per cent, said the report. However, in the medium to long term Energy Intelligence expects increases to be at least partially offset by significant efficiency gains as processors improve, new cooling solutions are integrated, and training algorithms are optimised. Leading GPU manufacturers have told Energy Intelligence that these efficiencies will likely scale at least as quickly as AI itself.

It also agreed with the IEA in its prediction that increased rollout and technological enhancements to AI will serve as a net accelerator of the low-carbon transition, irrespective of its impact on global electricity demand.

"AI is expected to play an important role in efforts to improve costs and efficiency of low-carbon power generation, transport, and storage, helping to accelerate the transition by rapidly decarbonising energy grids and easing the integration of more intermittent power generation technologies such as solar or wind," said the report. Energy Intelligence also said it has witnessed a strategic shift in how the US, EU and China are positioning energy systems to support AI's power needs; energy supply, therefore, is likely to impact how AI industries develop across geographies as much as AI will shape energy demand.

Photo by Christian Lue

EU walks a tightrope as it weighs up gas supply options

The EU is facing a complicated task in balancing trade talks with the Trump administration over gas supplies, while accelerating its exit from use of Russian gas. **Junior Isles**

Junior Isles

The European Union is weighing up its options on securing more gas, as it faces pressure from the US to buy more supplies, while pondering how to exit long-term gas contracts with Russia.

US President, Donald Trump has suggested that the EU buys about $350 billion of US LNG in order to reduce its trade deficit. According to Sarah Brown, Europe Programme Director, Ember, it "would be difficult to fathom" how the EU could accommodate this. "Europe already takes 45 per cent of its LNG from the US, and that is valued at about $13-18 billion per year," she said.

The European Commission has reiterated that it is ready to discuss energy with the Trump administration as part of trade talks, but it is careful about doing so on Trump's terms.

"We are absolutely ready to discuss and to negotiate," said Commission spokesperson Anna-Kaisa Itkonen. "We want to replace Russian LNG. This means we could operate with the US, but also with our other partners," Itkonen said, adding that the EU was keen to avoid "over-dependence on any single supplier".

The bloc is also concerned that Trump's ambition to sell more LNG to the EU does not align with its renewables ambitions.

The EU's position is further complicated by its goal to eliminate Russian gas from its energy system by 2027 under its RePowerEU plan.

Last month Brussels said it was exploring legal options that would allow European companies to break long-term Russian gas contracts without paying hefty penalties.

"If the whole idea is not paying Russia, then [paying compensation] would undermine the whole purpose," one EU official told the *Financial Times*.

The complexity for the Commission's lawyers, however, is that contracts are confidential and tend to differ. Using the war in Ukraine to call *force majeure* may not be legally sufficient, one EU official said.

Instead of a full ban on Russian gas imports, Brussels-based think-tank Bruegel has argued in favour of tariffs, noting that they would generate revenue for the EU and force Russian suppliers to lower prices to remain competitive. Further, unlike sanctions, tariffs only require a majority of EU member states to back them in order to be approved. Hungary's pro-Russia government has already threatened to reject gas sanctions, which need unanimous approval from the EU's 27 member states.

"It's a mess," one EU diplomat told the *FT*. "How does the US fit in all this? How do we diversify?"

Despite pressure from Brussels, EU nations are also wary of forcing companies to cut LNG contracts with Russia amid concerns that it will push up prices when companies are struggling with geopolitical turmoil and high costs.

Cold winter weather and geopolitical instability sent European gas prices soaring to a two-year high in the first quarter of this year.

The average TTF price – a key indicator of gas prices in Europe – reached €46.79/MWh in the first three months of this year, a 9 per cent increase on the final quarter of 2024.

The rise was sparked by a cold winter which reduced storage levels, ongoing geopolitical tensions, and anxieties about a trade war with America after President Trump promised a raft of import tariffs on European countries.

According to Montel Analytics Q1 2025 saw multiple occurrences of brief "Dunkelflaute" periods, prolonged periods of low wind. Combined with a cold snap, this resulted in high levels of fossil fuel-powered generation and therefore high prices.

The energy analytics company said fossil fuel generation jumped 23 per cent on the previous quarter to 242.9TWh, with gas fired power the major contributor (60 per cent) to this total.

Trump tariffs could severely disrupt renewables industry

Tariffs proposed by the US' Trump administration could throw the green energy sector into turmoil, according to clean energy experts.

The heavy duties on electrical components, battery storage and other equipment from China, southeast Asia and Europe pose a serious threat to an industry already feeling the effects of the US President's anti-green energy stance.

Executives warned that the added costs from tariffs would result in higher power bills. Electricity prices rose twice as fast as inflation last year, according to Bank of America, with several utilities requesting double-digit price increases from regulators to cover the rising costs of labour, materials and upgrades to the grid.

Sandhya Ganapathy, Chief Executive of EDP Renewables North America, one of the largest developers of wind, solar and battery storage in the US, told the *FT*: "This could be a potential de-railer when we really have to usher in this new era of energy dominance to put the US at the epicentre of data centres and AI technology. It is unsettling from a business perspective and creates disruption."

Julien Dumoulin-Smith, analyst at Jefferies, an investment bank, said the tariffs created "a lot of turmoil" at a time when businesses were already uncertain about whether Trump would cut lucrative incentives for green energy provided by former US President Joe Biden.

He explained: "Tariffs provide another reason for companies to delay investments. And the current problem is that there just isn't a big enough domestic US supply chain yet in many renewable sectors, such as solar, battery storage and wind. There aren't many options but to purchase from overseas."

The US wind sector imports a lot of components such as blades, drivetrains and electric systems, with almost half of imports coming from the EU in 2024, according to Rystad.

A February report by Wood Mackenzie warned that universal 25 per cent tariffs on all imported wind products would increase project costs by 7 per cent and put some projects at risk.

Richard Power, Partner at Clyde & Co., commented: "While President Trump's tariffs are sector-agnostic, the US's low-carbon energy industry is likely to be hit particularly hard as crucial components for solar energy, battery storage and other renewable energy projects are predominantly sourced from China, southeast Asia and Europe.

"As the capital cost of developing such projects increases, the competitiveness of the US's clean energy industry will likely deplete as innovation is stifled and investors lose interest, having already lost many federal incentives."

Clean energy share of global electricity mix tops 40 per cent

More than 40 per cent of the world's electricity was generated by non-fossil fuel energy sources in 2024, according to a new report from think-tank Ember.

The findings, however, came as carbon dioxide emissions, which warm the planet, rose to an all-time high, with hot weather pushing up the overall demand for power. That meant an overall increase in the use of fossil fuel-fired power stations.

"Amid the noise, it's essential to focus on the real signal. Hotter weather drove the fossil generation increase in 2024, but we're very unlikely to see a similar jump in 2025," said Phil Macdonald, Ember's Managing Director. The reports notes that solar power continues to be the fastest-growing energy source, with the amount of electricity it generates doubling every three years since 2012. "Solar power has become the engine of the global energy transition," said Macdonald.

While solar has been the clean energy champion Dr Beatrice Petrovich, senior analyst at Ember says she is looking forward to seeing wind – which generated 18 per cent of EU electricity – accelerate this year thanks to faster permitting and, hopefully, more favourable conditions.

Last month Ørsted, the world's largest offshore wind power developer, called on Europe to do more to support an industry at risk of a "downward spiral", as Donald Trump's new tariffs heap further pressure on its struggling US operation.

Rasmus Errboe, Chief Executive of the Denmark-based company, said European offshore wind was in a "tough place" due to rising costs, supply chain constraints and uncertainty over electricity prices. He also said Trump's new tariffs would have a "meaningful impact" on the cost of its projects in the US, where Ørsted has faced significant difficulties.

At the recent WindPower Europe event in Copenhagen last month, the wind industry proposed a new deal to speed up and de-risk the build-out of homegrown and competitive offshore wind energy. The proposal calls on European governments to auction at least 100 GW of new offshore wind over 2031-2040.

SIEMENS energy

It takes all of
our energy
to shape the
future

Energy resilience: Together, we can get it done.

LET`S MAKE TOMORROW DIFFERENT TODAY

Scan the QR code
to learn more

Siemens Energy is a trademark licensed by Siemens AG.

Landmark New York offshore wind project cancelled

■ Equinor may appeal halt to Empire Wind ■ Companies slow investment in face of uncertainty

Janet Wood

US Interior secretary Doug Burgum has ordered Equinor to halt work on the 810 MW Empire Wind project off the coast of New York City. The decision to pause the project is an escalation in the Trump administration's offensive against the country's offshore wind sector, which has prompted leading developers, including Shell and TotalEnergies, to reduce or slow down their American ventures.

New York Governor Kathy Hochul vowed to "fight" the Trump administration's decision. "I will not allow this federal over-reach to stand," she said in a statement.

Equinor said it was complying with the order affecting project activities and that immediate steps had been taken to start suspending relevant marine activities. Equinor said it would "engage" with the interior department "to understand the questions raised about the permits we have received from authorities" and that it was considering legal remedies, including appealing the order.

President Donald Trump had already paused offshore wind leasing and permitting and ordered a review of projects. Consultancy Rystad Energy estimated that more than 90 per cent of the country's planned offshore wind projects, totalling more than 60 GW, were at "serious risk", because most rely on the federal government for permitting approvals.

The Oceantic Network estimated recently that more than $40 billion has been invested in the US offshore wind sector, with many projects backed by European companies.

"Doubling back to reconsider permits after projects are under construction sends a chilling signal to all energy investment," said Jason Grumet, Chief Executive of American Clean Power. "These political reversals are bad policy, whether applied to pipelines or wind farms."

Nearly $8 billion in renewable energy investments and 16 new large-scale factories and other projects were cancelled, closed or downsized in the first three months of 2025 amid escalating market uncertainty, according to E2's latest Clean Economy Works monthly update.

However some companies continue to invest in the clean economy. Businesses in March announced more than $1.6 billion in investments for new solar, EV and grid and transmission equipment factories across six states. Subcontractors including Norwegian offshore wind suppliers Autronica, DOF and Uptime International have also maintained plans to expand their activities in the US.

Thor Egil Hafnor, Global Business Development Manager at Autronica, said: "Many offshore wind farms already have take-off and lease agreements. These projects are underway and relatively safe."

Meanwhile, Michael Timberlake, E2 Communications Director, commented: "If this self-inflicted and unnecessary market uncertainty continues, we'll almost certainly see more projects paused, more construction halted, and more job opportunities disappear."

Mexico reconsiders shale gas limitations to cut US gas imports

Photo by Jezael Melgoza

Mexico's government is talking to the private sector about reducing its dependence on the USA for gas supplies by expanding fracking, according to recent reports.

The USA provides around 70 per cent of Mexico's gas but following President Trump's announcements on tariffs, President Claudia Sheinbaum's ruling party is aiming to cut Mexico's exposure to US trade. She has told officials to explore fracking to help deliver energy independence and at a recent event said she wanted to reduce natural gas imports from the US by increasing production in Mexico by over 30 per cent by 2030 with "sustainable" methods.

Mexico has the sixth-largest recoverable shale gas reserves in the world, according to US government data. It allows fracking but its use is extremely limited. A process to award contracts began in 2018, but the contracts were cancelled by President Andrés Manuel López Obrador. Any new investment may be taken on in a new mixed public-private partnership model recently passed into law, it was suggested.

Recently Victor Padilla, Chief Executive of state-owned oil company Pemex, told a meeting of experts that the government wanted "an opinion from those who know what's in the subsoil… the opportunities we have, how much it would cost and what we could get".

Puerto Rico hopes to cut costs with solar and batteries

The US Department of Energy (DOE) has set in motion plans to replace fossil fuelled power plants in Puerto Rico with solar power and battery storage with loans of over $1.2 billion.

In a move toward more sustainable energy, the DOE announced projects to boost solar power production in the territory.

The Loan Programs Office recently granted one loan guarantee of $584.5 million to Convergent Energy, which will support new capacity in the areas of Coamo, Caguas, Peñuelas and Ponce. It has conditionally granted two more to organisations contracted to supply power and energy storage to municipalities in Puerto Rico.

These loans, which total over $1.2 billion, would fund the building of solar farms and battery energy storage systems across Puerto Rico.

These plans would "more than double the LPO's support for utility-scale solar generation and battery energy storage in Puerto Rico" if finalised, according to *Electrek*.

Currently Puerto Rico relies on imported fuel, its infrastructure is underfunded, and it is in the path of frequent tropical storms. As a result, the cost of energy for citizens is double the US average.

The investment announced by DOE could see significant renewable energy installed on the US territory and also lower the cost of living for Puerto Ricans.

Trump orders reversal of emissions limits and boost to coal

Photo courtesy of History in HD

■ Coal fired station seeks to cancel upgrades
■ Renewables may remain direction of travel

Janet Wood

A coal fired power station in Montana has requested a two-year exemption from US Environmental Protection Agency (EPA) standards on airborne emissions of heavy metals including lead, arsenic, and mercury. The owners of the Colstrip plant had argued it would cost hundreds of millions of dollars in upgrades to meet a compliance deadline of 2028.

The potential exemption came after President Donald Trump signed executive orders recently giving 66 coal power plants relief from unspecified regulations. The orders will also direct federal agencies to repeal any regulations that "discriminate" against coal production, open new federal lands for coal mining and explore whether coal-burning power plants could serve new AI data centres.

In a move that could face legal challenges, Trump directed the Energy Department to develop a process for using emergency powers to prevent unprofitable coal plants from shutting down in order to avert power outages.

The orders also seek to promote coal and coal technology exports and to accelerate development of coal technologies. Trump said: "Nothing can destroy coal. Not the weather, not a bomb — nothing," and added, "and we have more coal than anybody."

A new National Energy Dominance Council is tasked with driving up domestic oil and gas production, as well as coal. It has been granted authority over federal agencies involved in energy permitting, production, generation, distribution, regulation and transportation, with a mandate to cut regulation, enhance private sector investment and focus on innovation.

Rich Nolan, President and CEO of the National Mining Association, said Trump's executive actions "clearly prioritise how to responsibly keep the lights on, recognise the enormous strategic value of American-mined coal and embrace the economic opportunity that comes from American energy abundance".

However, commentators suggest the outcome of Trump's attempt to boost coal is likely to be temporary because natural gas is cheaper and the market for wind and solar power remains strong.

"The main issue is that most of our coal plants are older and getting more expensive to run, and no one's thinking about building new plants," said Seth Feaster, a data analyst at the Institute for Energy Economics and Financial Analysis. "It's very hard to change that trajectory."

Meanwhile a recent bill passed in the Texas Senate has set a target for 50 per cent of new power plant capacity to be "sourced from dispatchable generation other than battery energy storage". If passed by the House and signed by Republican Gov. Greg Abbott, the bill would reward gas plant operators.

Trump tariff plans 'undermine SMR programme'

The US Department of Energy (DOE) has re-issued a $900 million solicitation to support the deployment of small modular reactors.

"America's nuclear energy renaissance starts now," said Secretary of Energy Chris Wright. "Abundant and affordable energy is key to our nation's economic prosperity and security. This solicitation is a call to action for early movers seeking to put more energy on the grid through the deployment of advanced light-water small modular reactors."

DOE is offering funding to de-risk the deployment of Generation III+ light-water small modular reactors (Gen III+ SMR).

However, Dr. Joseph Romm, a former Acting Assistant Secretary of Energy, argued that SMRs are a "false promise" for powering proposed artificial intelligence (AI) data centres.

His research report considered recent economic developments and current and cancelled SMR proposals. It also said President Trump's tariffs (and other policies) threaten the nuclear industry.

"Any success the US might have with SMRs depends on foreign sales, foreign uranium, and foreign components. So, Trump's ever-shifting tariffs – as well as his alienation of major US trading partners like Canada and Europe – make SMRs an even riskier bet than they already are. Also, if the economy shrinks due to Trump's policies, so does demand for new electric power plants, particularly the most expensive and risky experimental plants, like SMRs," said Romm.

Asia outshines Europe and US in energy transition momentum

- Large Asian nations all reduce fossil fuel use and boost clean power output
- South Korea led region with 15 per cent reduction

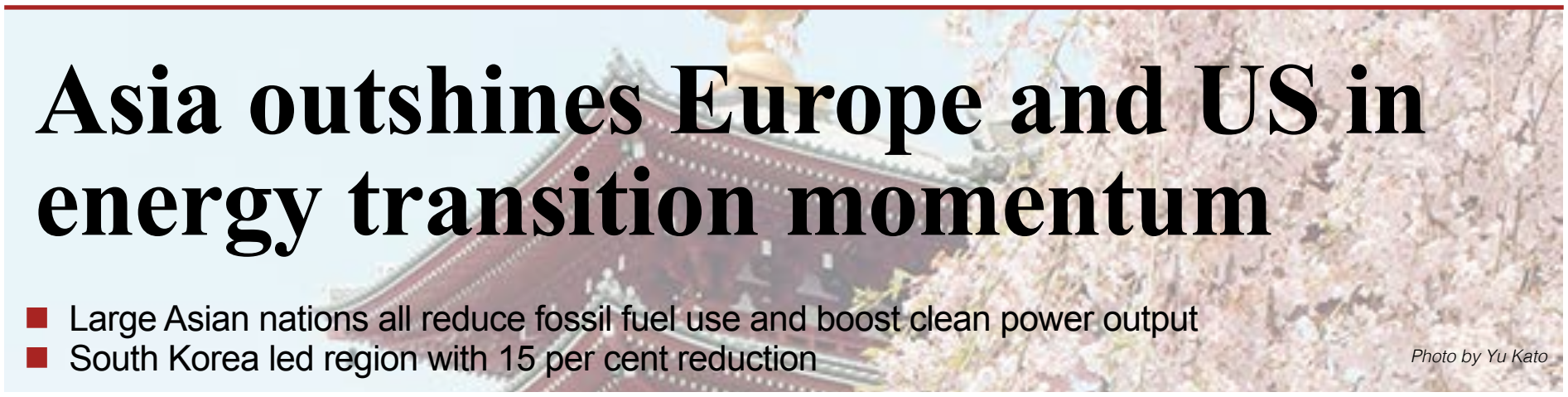


Photo by Yu Kato

Junior Isles

Asia has already built up a considerable lead over several European countries and the United States in terms of energy transition progress so far in 2025.

Large Asian nations including China, India, South Korea and Japan all reduced fossil fuel use and boosted clean power output by more than their international peers in early 2025, according to data from energy think-tank Ember.

While most of Asia made cuts to fossil fuel use for electricity production in January compared to the same month in 2024, the US and Europe have both expanded fossil fuel-fired generation, thereby reversing their transition momentum.

Asian nations also lifted clean power production by more than most of Europe's top economies, highlighting an important power generation trend that stands to impact annual emission reduction efforts if sustained for the full year.

South Korea led the region with a 15 per cent reduction from a year ago, as record nuclear power output allowed utilities to cut back on coal and gas use there. Vietnam, China, India and Asia as a whole also made year-over-year cuts to fossil fuel-fired generation in January, which is typically one of the peak demand months for power in Asia.

India was the leader among clean power additions in January, registering a 26 per cent rise in clean electricity production compared to January 2024. Near-record output from solar, nuclear and bioenergy plants helped lift India's clean power total.

Several other Asian nations also registered strong clean power generation momentum in early 2025, with China, South Korea, Japan and Asia as a whole all notching up 16 per cent or greater year-on-year increases in clean electricity output in January.

While Asian nations are making clear progress against energy transition goals, the same trend has not been seen in Europe and the United States in recent months.

A combination of weak wind power output across Europe and strong electricity demand growth in North America has triggered a rise in utility use of fossil fuels on both continents this year.

Power producers across Europe collectively raised fossil fired electricity production by 5 per cent in January from the same month a year ago, with the Netherlands and Poland among the standouts with even larger fossil fuel use increases.

A major driver of that higher burn rate of gas and coal was a widespread reduction in clean power generation, especially from wind farms.

Cumulative wind electricity generation in Europe during January and February was down 16 per cent year from the same months in 2024. That clean power shortfall forced utilities to increase output from natural gas and coal plants.

India must address bottlenecks to achieve 2030 solar target

Photo by Chelsea at Unsplash

While India's solar capacity additions have been impressive, the availability of domestically made modules and cells still lags, thereby threatening its solar targets, according to clean energy research group Mercom India.

According to Mercom, average selling prices remain high, sourcing is a challenge, and now the new US tariffs have added more uncertainty.

"For India to achieve its 280 GW solar target by 2030, it must address these bottlenecks and align its manufacturing capacity expansion policies with its development goals. For manufacturers, relying on exports as a growth strategy is looking increasingly risky right now," commented Raj Prabhu, CEO of Mercom Capital Group.

In calendar year (CY) 2024, the country added 25.3 GW of solar modules and 11.6 GW of solar cell capacity, according to Mercom's recently released State of Solar PV Manufacturing in India 2025 report.

Manufacturing capacity additions in 2024 were primarily driven by demand for the solar project pipeline and the reimposition of the Approved List of Models and Manufacturers (ALMM) order from April 2024.

This mandate requires that all government-backed solar projects, net-metering projects, and open-access renewable energy initiatives source their solar PV cells from the ALMM List II. India already has an ALMM List-I for solar modules and is also set to introduce List-II for solar cells from June 1, 2026.

Approximately 64.6 GW of the total module production capacity was listed under the ALMM order, as per the updated List-I issued by the Ministry of New and Renewable Energy (MNRE) as of January 6, 2025.

Gujarat was the most preferred location for installing photovoltaic (PV) manufacturing facilities, with 42 per cent of the country's module capacities located in the state. As of December 2024, Gujarat accounts for over 37 per cent of the country's annual solar cell production capacity, the highest in the country.

Tamil Nadu and Rajasthan were the other top states, accounting for over 10 per cent and over 8 per cent of the country's solar module production capacity, respectively. Karnataka and Tamil Nadu were second and third, with solar cell production units contributing to over 18 per cent and 12 per cent of the country's total capacity, respectively.

Various public sector and government entities issued tenders totalling 9.9 GW to procure solar modules in 2024, representing an increase of over 6 per cent YoY. In 2024, 1.7 GW of module and 11.3 MW of cell supply auctions were concluded.

In 2024, a total of 65.9 GW of solar modules and cells were imported. Modules accounted for over 36 per cent of the imports, while cells made up nearly 64 per cent.

In 2024, domestic manufacturers exported 4.5 GW of solar modules, representing a 6 per cent decrease from the 4.8 GW exported in 2023.

Vietnam adds nuclear to $136 billion plan to boost power capacity

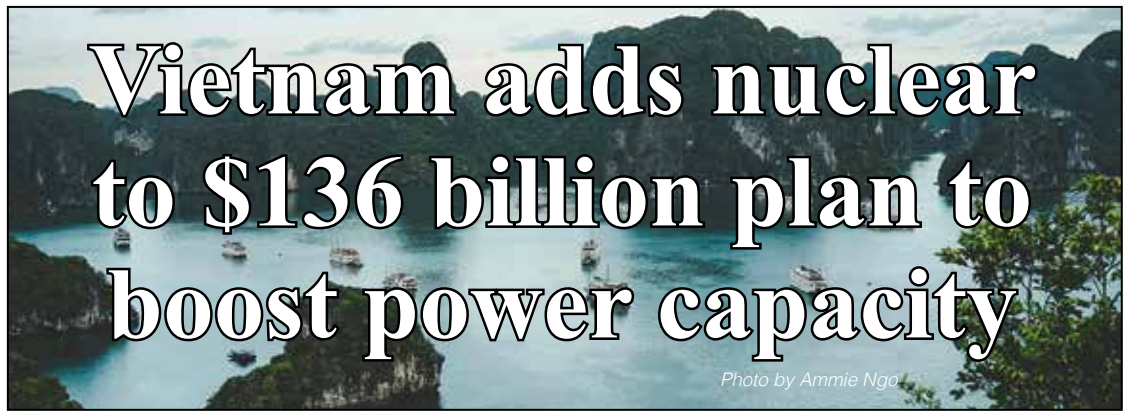


Photo by Ammie Ngo

- Plan to raise capacity from 80 GW to 183-236 GW by 2030
- First nuclear power plants would be online between 2030 and 2035

Vietnam aims to significantly ramp up its power generation capacity by 2030, focusing on renewable energy and adding nuclear power to the mix, according to the country's newly amended national power plan. To meet the targets, Vietnam would need a total investment of $136.3 billion by 2030, the government said, equivalent to more than a quarter of its 2024 gross domestic product.

Under the adopted blueprint, Vietnam wants to raise its total installed capacity to a range of 183 to 236 GW by 2030, up from more than 80 GW at the end of 2023, the government said last month.

To do so, the coal-reliant country is renewing a bet on nuclear power, after it suspended its programme in 2016 following the Fukushima Daiichi nuclear power plant disaster in Japan and amid budget constraints.

The first nuclear power plants would be online between 2030 and 2035, with a combined capacity of up to 6.4 GW, the government said, adding that another 8 GW would be added to the mix by mid-century.

Officials have said Vietnam has discussed small modular reactors, which the International Atomic Energy Agency says are still under development but would be more affordable to build than large power reactors.

The government said earlier this year it would hold talks with foreign partners about nuclear power projects, including those from Russia, Japan, South Korea, France and the United States. Sources close to the government, however, told *Reuters* Vietnam is prioritising Russian and Japanese contractors, but remains open to others that offer good technology and competitive prices.

The country's amended power plan will also see solar power account for 25.3-31.1 per cent of total capacity by 2030, up from 23.8 per cent in 2020, while onshore and nearshore wind energy would go up to 14.2-16.1 per cent from nearly zero at the start of the decade, said the government.

These new targets come after authorities flagged a retroactive change to preferential prices for producers of solar and onshore wind energy, which has sparked concern among investors.

The southeast Asian industrial hub needs to fast expand power supply as electricity demand grows, to avoid shortages that recently alarmed foreign investors. It also wants to cut its use of coal, which remains its main source of energy.

State of Victoria to open offshore wind auction in September

The Australian state of Victoria plans to launch an offshore wind auction in September of this year, according to the Offshore Wind Energy Implementation Statement 4 (IS4), released by Victoria's Minister for Energy and Resources Lily D'Ambrosio last month.

The statement outlines the next steps towards building 2 GW of offshore wind capacity in the Australian state's waters. Victoria plans to install 2 GW of offshore wind capacity by 2032 and has set offshore wind energy targets of 4 GW by 2035 and 9 GW by 2040.

The state government is currently in the Registration of Interest (ROI) process that commenced in March and will close this month. The ROI allows for the holders of offshore wind feasibility licences in Victoria to access the information needed to inform the Request for Proposal (RFP) stage later this year. It expects to award contracts before October 2026.

biofuels international
CONFERENCE & EXPO
Sustainable Aviation
FUELS SUMMIT
BRUSSELS | 24-25 June 2025
Biofuels networking at its best
Network with producers, policy makers, traders, airlines, technology partners and more
Meet over 300 industry experts from across the biosphere
Two full days of high-quality presentations
Over 25 countries represented
All networking functions included in the price
Now in its 16th year. Brought to you by the world's leading global biofuels publication
One ticket gets you into all three streams – Biofuels, SAF and Biogas – allowing delegates to maximise their time and get the best value.
Visit the website to view the speakers, agenda and to sign up.
www.biofuels-news/conference

ENERGY TRADING LEADERS SUMMIT
24 - 25 June | Amsterdam, Netherlands by tradetech
Claim A 10% Discount With: ETTEI
Europe's Leading Energy Traders Shaping Future Markets
Domenico De Luca, Head of Trading & Sales & Executive Board Member, AXPO
Milena Videnova, Managing Director, Bulgaria, AXPO
Michel Kolly, Executive VP, Power Trading & Origination, TotalEnergies
Igal Madar, Head of Trading & Managing Director, ENGIE Global Energy Management Solutions
Bhavuk Chugh, Head of Origination - Northern Europe, Centrica Energy
Navin Parasram, Head of Trading & Executive Board Member, Alpiq
Eugen Luja, Global Chief Risk Officer - Gas & LNG Trading, Repsol
Rimshah Javed, Principal Originator, Danske Commodities
Current Sponsors Include:
gmsl meteomatics MOLECULE MUREX quantitative brokers RJC Group SYMPHONY TRADING TECHNOLOGIES volue

LET'S TALK FLOW BATTERIES!
IFBF 2025
24-26 JUNE 2025
VIENNA, AUSTRIA
...and online

Power Summit 2025
3–4 June 2025 · Maison de la Poste · Brussels
Power Play
Confirmed speakers include
Sebastian Burduja, Romanian Minister of Energy
Jean-Charles Ellermann-Kingombe, NATO Assistant Secretary General for Innovation, Hybrid, and Cyber
Connie Hedegaard, Former EU Commissioner for Climate Action, Professor, Board Member
Anna Stürgkh, Member of the European Parliament
Register now
power summ't 2025 Power Play
eurelectric
powersummit2025.eurelectric.org

Stockholm energy company takes FID on BECCS plant

Photo by Raphael Andres

- Carbon emissions to be captured from 2008
- E.On signs BECCS agreement with Copenhagen waste to energy plant

Janet Wood

Stockholm Exergi has taken a final investment decision on what it claims is the world's first large-scale bioenergy power plant with carbon capture and storage.

Stockholm Exergi is the energy company providing power and heat for Stockholm, owned by the City of Stockholm and Ankhiale, a consortium of leading European pension funds (APG, PGGM, Alecta, Keva and AXA IM Alts).

Stockholm Exergi has operated a test facility since 2019.

Construction will start immediately on the new plant, BECCS (bioenergy with carbon capture and storage) Stockholm, in the energy port near Värtaverket in Stockholm, with start-up expected in 2028.

Värtaverket produces heat and electricity from forestry and sawmill residues.

The SEK13 billion ($1.3 billion) investment in the new plant includes €180 million from the EU Innovation Fund, Swedish government aid and revenue from the private market via purchases of negative emission certificates under long-term offtake commitments from Microsoft and Frontier Group, which includes Meta, Stripe, Alphabet, Shopify and McKinsey.

Anders Egelrud, CEO of Stockholm Exergi, said: "We have worked purposefully for many years to make bio-CCS a reality, and today's decision means that we are moving from plans to action. With this, we assume global leadership in the industry for permanent removals."

The project will deploy Capsol Technologies' carbon capture solution. It plans to permanently remove 800 000 tonnes of carbon dioxide annually with an end-of-pipe solution using hot potassium carbonate (HPC) solvent.

Capsol said it currently has a pipeline of biomass and energy from waste projects. "With the first FID for a large-scale project using our technology now in place, we expect this to accelerate commercial traction and de-risk adoption across industries," said Wendy Lam, Chief Executive of Capsol Technologies.

Stockholm Exergi has selected Northern Lights as its partner for carbon dioxide transport and storage and signed a 15-year contract with the company.

TotalEnergies and its partners, Equinor and Shell, also announced a FID, which will increase the Northern Lights' transport and storage capacity from 1.5 million tonnes to more than 5 million tonnes of carbon dioxide per year from 2028.

Stockholm Exergi is the fifth company to commit with Northern Lights for transport and storage of its CO_2 emissions, after Heidelberg Materials and Celsio in Norway, Yara in the Netherlands and Ørsted in Denmark.

Meanwhile, E.On and the municipal waste company ARC have signed an agreement on the project CopenCapture in Copenhagen. The project aims to capture 400 000 t of carbon dioxide annually from the stack at the Copen-Hill waste-to-energy plant and store it underground.

France makes hydrogen grants but cuts ambition

- Largest grant for Lhyfe project in Normandy
- UK shortlists for next allocation round

Janet Wood

France has reduced its target for installed electrolyser capacity powered by renewables or nuclear power by 2030 from 6.5 GW to 4.5 GW in a recent national strategy update. It has also reduced its expected capacity in 2035 from 10 GW to 8 GW of capacity by that year.

The government said the low-carbon hydrogen market has taken longer to develop than expected when it had originally set out its targets in 2020.

However, it continued to support the industry with the news of a €149 million subsidy for Lhyfe's 'Green Horizon' project, which will help to decarbonise one of Europe's largest industrial port areas, in Normandy. Lhyfe said the project will allow it to pass the 100 MW milestone in installed electrolysis capacity.

The green hydrogen production plant located near the Grand Canal of Le Havre was selected in 2022 by the European Commission as part of the third wave of IPCEI (Important Projects of Common European Interest) dedicated to hydrogen.

The Lhyfe production site, to be located on land in Gonfreville-l'Orcher, is expected to be completed by 2029. Hydrogen will be delivered primarily by pipeline directly to the customer's industrial site.

Lhyfe now has four production sites in France and Germany. Matthieu Guesné, Founder and Chief Executive of Lhyfe, said: "By contributing to the decarbonisation of Le Havre industrial-port area starting in 2029, the Green Horizon project marks a real turning point – one that is essential if we are to decarbonise our industrial uses on a large scale."

He described the new French National Hydrogen Strategy as, "excellent news for both the French and European markets", adding that "it now provides the clarity and long-term visibility that stakeholders across the hydrogen ecosystem need to make informed decisions and move forward".

The French government also agreed €99.84 million in funding to Gen-Hy to build an electrolyser production plant in Allenjoie, with operations set to begin in 2026.

Gen-Hy is a start-up specialising in hydrogen-related technologies that recently welcomed Saint-Gobain as a shareholder, following initial financial backing from the Eiffage Group. The industrial site plans to produce up to 350 anion exchange membrane (AEM) electrolysers annually, with power outputs ranging up to 2 MW.

In the UK, meanwhile, 27 hydrogen projects have been shortlisted in the government's Hydrogen Allocation Round 2, after over 80 applications were made.

Industry Minister Sarah Jones said: "We are deploying hydrogen at a commercial scale for the first time."

The First Hydrogen Allocation Round saw 11 projects being allocated over £2 billion in government funding, totalling 124 MW of production capacity. Five of these projects have now signed their contracts.

Corporates lead in recovering PPA market

The European renewable energy Power Purchase Agreement (PPA) market demonstrated strong recovery in 2024, with nearly 19 GW of new capacity contracted, according to the latest Europe Renewables PPA Tracker report released by Wood Mackenzie.

It said Corporate Power Purchase Agreements (PPAs) "continued to dominate the market", representing over 70 per cent of the regional market, and Spain and Germany accounted for 30 per cent of the deals.

In one recent example PPAs with industrial and commercial customers are already in place for Windanker, Iberdrola's third offshore wind project in the German Baltic Sea. The 315 MW project was recently granted approval by the Federal Maritime and Hydrographic Agency (BSH). Operation is scheduled for 2026.

Dan Eager, Research Director, European Power & Renewables at Wood Mackenzie, said: "The technology and data sectors were the primary drivers of offtake activity in 2024. These power-intensive businesses are increasingly relying on PPAs to sustain their future operations and meet sustainability goals."

Eager said that "as the PPA market matures, innovative contractual arrangements are becoming more prevalent" with an increase in deals involving renewables co-located with battery storage, addressing the challenge of negative pricing periods.

"We're seeing a shift towards more sophisticated PPA structures," he noted. "While still a small part of the overall market, hybrid storage arrangements that combine renewables and batteries in a single contract are gaining traction, particularly among energy-intensive industries and data centres seeking 24/7 energy matching."

Floating wind wins development permits

Photo by Partha Sarathi Kar

Floating wind projects off the coast of Portugal and Scotland have won key planning approvals.

Gazelle Wind Power recently said it had won a 10-year TUPEM authorisation (Titulo de Utilizacao Privativa do Espaco Marítimo), which will allow it to install the 2 MW Nau Azul floating wind demonstrator project off the coast of Aguçadoura, Portugal.

Issued by Portugal's Directorate-General for Natural Resources, Safety and Maritime Services (DGRM), the TUPEM authorisation grants Gazelle Wind Power Portugal, S.A., exclusive rights to occupy and utilise a designated area of national maritime space for the installation, operation and testing of its patented platform, which reduces steel use with a unique geometry and counterweight system.

The project site in Aguçadoura previously hosted WindFloat 1, one of Europe's earliest floating wind pilot projects.

Gazelle Wind Power Chief Executive Jon Salazar commented: "It's a major step forward in our roadmap to commercialisation."

Meanwhile, the Salamander offshore wind farm, being developed by a joint venture of Ørsted, Simply Blue Group and Subsea7, has been awarded Planning Permission in Principle for the onshore aspects of its proposed floating development, located 35 km off Peterhead on the East Coast of Scotland. Hugh Yendole, Project Director for Salamander, praised "an almost-unheard-of unanimous approval in record time – only seven months after submission."

UK and Germany act to speed up permitting

The UK and Germany have both acted to reduce administrative barriers to rolling out green energy at speed.

Germany's CDU/CSU and SPD parties have agreed to exempt wind and solar farms from a pre-authorisation requirement. Instead, the project developer can start construction once they confirm compliance with the relevant rules. Authorities will then verify compliance retrospectively.

"Germany has set itself ambitious targets for climate neutrality," said Patrick Lemcke-Braselmann, Co-CEO of aream Group SE. "The new government appears serious about achieving them."

He said it was not clear whether cable routes and storage facilities will also fall under the new, procedure-free regulation – if they do, he said installed capacity in Germany could increase six-fold within four years.

Meanwhile GB energy regulator Ofgem has given the green light to fast-track connections to the electricity grid for green energy projects that will help the UK government meet its 'Clean Power 2030' target. The new system will prioritise those that have permitting and funding in place and replace a 'first come first served' arrangement that saw some projects wait up to 15 years for connections. Energy Secretary Ed Miliband said the changes would "axe 'zombie' projects and cut the time it takes to get high growth firms online". He added: "In an uncertain world, our message to the global clean energy industry is clear; come and build it in Britain because we are a safe haven."

Global nuclear power capacity to reach 494 GW by 2035

- CAGR of 2 per cent forecast between 2024 and 2035
- Advances in SMR technology set to spur growth

Nadia Weekes

Advancements in small modular reactors (SMRs) technology and supportive policies for low-carbon baseload power are behind a renewed interest in nuclear power, with capacity forecast to grow from 395 GW in 2024 to 494 GW by 2035, according to data and analytics company GlobalData.

In its latest report on the nuclear power market to 2035, GlobalData forecasts nuclear electricity generation to rise from 2616 TWh to 3410 TWh over 2024–2035, reflecting a CAGR of 2 per cent.

Globally, countries with aging reactors have pursued lifetime extensions, while others have aggressively expanded their nuclear fleets, especially in Asia.

The US remains the world's largest producer of nuclear power, with 97 GW of installed capacity generating 787.6 TWh in 2024. France, which relies on nuclear for over 60 per cent of its electricity, follows with 61.4 GW and 333.3 TWh. China, with the youngest and fastest-growing nuclear fleet, has expanded its capacity to 56 GW, producing 386.1 TWh.

Alongside a growing focus on energy security, government support and advancements in SMRs and next-gen technologies, Mohammed Ziauddin, power analyst at GlobalData, mentions a surge in electricity demand from data centres as a major driver for the increasing adoption of nuclear energy worldwide.

Unlike traditional large-scale nuclear reactors, SMRs offer compact designs and flexible deployment. With capacities typically under 300 MW, they can be factory-fabricated, transported and assembled on-site, significantly reducing construction time and costs.

Although only a few SMRs are currently operational, primarily in Russia and China, the global SMR pipeline is expanding rapidly, with over 100 reactors at various stages of development and more than 10 GW of capacity anticipated by 2035.

Ocean energy moves closer to commercialisation

The ocean energy sector continued to progress towards commercialisation in 2024 in Europe, with 165 MW planned for deployment in the next five years across 15 projects, according to the latest statistics released by Ocean Energy Europe (OEE).

In addition to European and national grant funding, the pipeline of tidal projects has been supported by dedicated schemes in the UK and France.

While this long-term commitment by national governments has created market visibility and attracted private investments, a continuous and coordinated interplay of revenue support and grant funding is needed to grow the pipeline even further and accelerate the industrialisation of tidal energy, according to OEE.

European grant funding is also supporting the progress of wave energy, with the first projects scheduled for deployment in the coming years. The sector has reached key technological and financial milestones, with several technologies now ready for farm-scale deployment. However, national revenue support schemes will be critical to make those projects bankable, grow the pipeline and meet national deployment targets.

As interest in ocean energy grows in the US and China, OEE is calling for government financial and political support to unlock the full potential of ocean energy for Europeans, and ensure that Europe maintains its global leadership.

EU funding will remain essential to drive new deployments and scale up the industry, according to Valentin Dupont, Senior Policy Officer at OEE. The European Investment Bank (EIB) must also step in with debt funding and guarantees to support the first pre-commercial farms, he added, which will lower the cost of capital, attract private investment and boost industrialisation.

Tanzania invites bids for construction of 100 MW solar project

The Tanzania Electric Supply Company Limited (TANESCO) is inviting tenders for the construction of a 100 MWp solar PV plant to be located in the Shinyanga region.

Agence Française de Développement financed the project's design, construction and installation. Part of the funding could be used to cover eligible payments for the plant's EPC contractors, according to TANESCO.

Tanzania has very little grid-connected solar capacity to date. The country aims to diversify its energy mix and reduce its reliance on hydropower.

VC funding for energy innovation at risk of slowing down

The range of new energy technologies under development is broader than ever before but signs of slowing momentum in venture capital (VC) funding could put innovation at risk, a new report by the International Energy Agency (IEA) has warned.

The State of Energy Innovation report shows that energy innovation has delivered major economic and security benefits globally. Today's increased emphasis on economic competitiveness, energy security and resilience makes progress on innovation more important than ever.

Although public and corporate energy R&D spending has grown at an average annual rate of 6 per cent in recent years, initial estimates for 2024 indicate that growth may be slowing in some advanced economies.

Venture capital (VC) funding for energy technologies surged more than six-fold from 2015 to 2022, reaching levels equivalent to all public energy R&D combined. This influx of private capital has supported around 1800 energy start-ups.

However, this investment trend reversed in 2023 and 2024, with VC funding declining by more than 20 per cent amid tighter financial conditions. Artificial intelligence was the only sector to see growth in VC funding during this period, potentially accelerating innovation but also drawing capital away from the energy sector.

"A wide range of technologies now appears to be coming close to market, offering hope for improvements in energy security, affordability and sustainability over the long term. But we require investment, both public and private, to scale up innovative solutions. The payback may not always be quick, but it will be lasting," said the IEA's Executive Director, Dr Fatih Birol.

Generation from renewables soars as data centre demand set to surge

- Renewables represent 92.5 per cent of global capacity additions
- Solar and wind energy dominate new installations

Nadia Weekes

Renewable power generation capacity increased massively during 2024 reaching some 4448 GW, with an addition of 585 GW representing a 92.5 per cent share of the total capacity expansion and a record 15.1 per cent rate of annual growth, according to the latest statistics from the International Renewable Energy Agency (IRENA).

Nonetheless, progress still falls short of the 11.2 TW needed to align with the global goal to triple installed renewable energy capacity by 2030, the agency warned. To reach this goal, renewable capacity must expand by 16.6 per cent annually until 2030.

In addition, progress reflects significant geographic disparities. As in previous years, most of the increase occurred in Asia, with China contributing almost 64 per cent of the global added capacity, while Central America and the Caribbean contributed only 3.2 per cent.

"The continuous growth of renewables we witness each year is evidence that renewables are economically viable and readily deployable," said IRENA Director-General, Francesco La Camera. "With economic competitiveness and energy security increasingly a major global concern, expanding renewable power capacity at speed equals tapping into business opportunities and addressing energy security quickly and sustainably," he added.

Solar and wind energy expanded the most, jointly accounting for 96.6 per cent of net renewable additions in 2024. Over three-quarters of the capacity expansion was in solar energy, which increased by 32.2 per cent, reaching 1865 GW.

Wind energy added 117 GW last year, according to the Global Wind Energy Council (GWEC), with 109 GW onshore and 8 GW offshore bringing cumulative wind capacity to 1136 GW.

Although 2024 was another record year for wind installations, there were large disparities in the pace of deployment globally, with the vast majority of additions being made in a small number of mature markets including China and Europe.

GWEC warned of increasing policy instability in some markets and highlighted the need to improve permitting, grid transmission and auctioning mechanisms to keep pace with the global trend for electrification while meeting climate targets.

Apart from solar and wind, hydropower expanded its capacity to some 1283 GW, bioenergy added 4.6 GW, and geothermal energy increased slightly by 0.4 GW.

Off-grid electricity capacity (excluding Eurasia, Europe and North America) nearly tripled, growing by 1.7 GW to reach 14.3 GW. Growth was dominated by off-grid solar energy, which reached 6.3 GW.

Meanwhile, the recently released BloombergNEF (BNEF) New Energy Outlook 2025 report, which maps out how the global energy transition could progress, indicates that greenhouse gas emissions have potentially seen structural decline for the first time globally.

Under the report's base case, the Economic Transition Scenario, demand for electric power rises 75 per cent by 2050 driven by economic development, electric vehicles, cooling needs and data centres. Robust adoption of clean power and electrification in road transport, coupled with long-term decline in coal and oil, could cut overall emissions by 22 per cent by 2050.

The greatest opportunities for power infrastructure investment will lie in the growing economies in Asia, the Middle East and Africa, according to David Hostert, global head of economics and modelling at BNEF, and lead author of the report.

"We expect data centre power demand in these markets to grow by six to 16 times by 2035 and reach 260 TWh," he said.

Data centres are expected to represent 4.5 per cent of total global power demand in 2035, rising to 8.7 per cent in 2050. BNEF estimates that an additional 362 GW of power generation capacity will be needed globally by 2035 to meet data-centre demand.

Siemens Energy delivers strong Q2

- Revenue forecasts raised for fiscal 2025
- Growth driven by strong performance in Gas Services and Grid Technologies

Junior Isles

Siemens Energy has delivered a strong second quarter of fiscal year 2025, exceeding market expectations.

The German power sector equipment manufacturer said it expects to make about €1 billion in profit in 2025 after upgrading its outlook because of a booming global electricity market. The figure is lower than the €1.3 billion profit it posted last year but higher than the guidance previously issued, which had said it expected roughly to break even.

The company also raised its revenue forecasts for the 2025 fiscal year, which ends in September, lifting them from 8-10 per cent to 13-15 per cent. Accoreding to the company, the growth was driven by particularly strong performance in the gas services and grid technologies division.

Gas Services saw orders increase by 102 per cent compared to Q2 FY2024 and revenue by 18.7 per cent. Orders in Grid Technologies were up 41.6 per cent, while revenues have surged by 33.7 per cent.

Siemens Energy has suffered a turbulent time on the stock market this year, with its share price rising and falling as much as 20 per cent within a matter of days in January.

The company has also had to cope with the after-effects of a crisis in its wind turbine division, Siemens Gamesa, that emerged in 2023. The company suffered a €4.6 billion loss that year after it revealed technical problems with some of its wind turbines. It returned to profit the following year.

The company now says it expects the wind turbine unit to enjoy positive revenue growth in 2025 but still suffer a loss of €1.3 billion before special items.

In late March the company said it will divest 90 per cent of its wind business in India and Sri Lanka, retaining a 10 per cent stake in the transferred business. It will divest 90 per cent of its wind business in India and Sri Lanka to a group led by TPG, retaining a 10 per cent stake in the transferred business. The agreement includes the manufacturing, installation, and service of onshore wind turbines in India and Sri Lanka. As part of the business transfer agreement, Siemens Gamesa plans to transfer around 1000 employees and two manufacturing plants in India into the new company. Siemens Gamesa will continue to support the business's growth through a long-term technology licensing agreement.

There was further good news for Siemens Gamesa last month with the announcement that it has installed the world's most powerful wind turbine, a 21.5 MW unit, at the Technical University of Denmark.

The new turbine model, SG DD-276, has a diameter of 276 m and surpassed the previous record held by China's Mingyang Smart Energy.

The project was partially funded by the European Union, after Siemens Gamesa received €30 million from the political union's innovation fund – one of the world's largest programmes dedicated to developing new low-carbon technologies.

Oil and gas majors regressing from 1.5˚C targets, says climate think-tank

New research released by the climate think-tank Carbon Tracker claims that "no major oil and gas producer comes close to being Paris-aligned, and many have regressed in the past year".

The report, 'Paris Maligned III', is the first analysis of the sector since the re-election of the Trump administration in the US and comes a decade after the landmark Paris Agreement was signed. It shows that almost all producers are planning to increase oil and gas production in the coming years, with most likely to invest in new projects that would be incompatible with a 1.7˚C, or even 2.4˚C, warming scenario.

Carbon Tracker said no energy company fully embraced net zero, and that many have gone backwards in recent months – reducing investment into renewables in the face of waning profits and shareholder demand for short-term returns.

Shiladitya Ghosh, co-founder and COO of British Direct Air Capture startup Mission Zero Technologies commented: "Scaling back renewable investment and increasing the production of fossil fuels is bad news for people and the planet, but this is obvious. Less clear is the poor economic decision-making of these firms.

"Oil and gas are not safe long-term investments – for company revenues or energy security. While it's true that renewables have become less profitable due to global conditions that have impacted every industry, like inflation, plus more specific factors such as the fluctuating cost and supply of critical minerals, the fact remains: committing to this fading business model is betting on the wrong horse."

In its own Sustainability & Climate – 2025 Progress Report, however, TotalEnergies said in 2024 it saw "the rewards of its integrated and balanced multi-energy strategy".

This strategy, which combines profitable growth and sustainable development, is anchored on two pillars: oil & gas (notably LNG) and electricity (notably renewable). It proved its relevance once again this year: TotalEnergies was the most profitable major for the third year in a row, while also being the major that invests the most in the energy transition, with close to $5 billion invested in 2024 in low carbon energies, primarily in electricity and renewables.

In electricity, TotalEnergies continues to build a profitable and differentiated business model, which is quickly becoming one of the company's cash engines. In 2024, TotalEnergies invested $4 billion in integrated power, increased its net electricity production by 23 per cent, and passed the 10 per cent milestone of electricity in its sales mix. This growth contributed to lowering the lifecycle carbon intensity of the company's energy products sold by 16.5 per cent in 2024 compared to 2015, exceeding the initial target of 14 per cent.

TenneT establishing new funding structure to separate Dutch, German operations

TenneT Holding is setting up a new funding structure to facilitate the separation of its Dutch and German operations into two standalone companies.

The company said the new funding structure "is part of TenneT's exploration of structural solutions for the equity needs of its German operations". Currently, TenneT raises all debt financing centrally at the holding level.

TenneT has established TenneT Netherlands, a wholly-owned subsidiary which will serve as the holding company for the Dutch transmission system operator (TSO) business. With the corporate reorganisation, future senior debt financing for the Dutch TSO business will be raised by TenneT Netherlands and for the German TSO business by TenneT Germany.

TenneT has been looking to sell TenneT Germany since 2023, with initial plans for the German government to take over the German TSO business.

Since January 1, 2025, TenneT has been operating as two businesses, one in the Netherlands and one in Germany, under one holding company, TenneT Holding, as part of the plan to bring in private investment into TenneT Germany.

On January 2, TenneT announced that the negotiations with the German state, via KfW representing the German Federal government, were terminated after the government of Germany informed the Dutch goverment that it was unable to deliver on the planned transaction due to budgetary challenges.

In March, *Reuters* reported that TenneT said it was still open for the German government to take a stake in TenneT Germany, and that the company was also considering a stock exchange listing for the German TSO as an alternative to raise capital.

Solar sector sees $4.8 billion in corporate funding in first quarter

Total corporate funding in the solar sector reached $4.8 billion across 39 deals in Q1 2025, according to Mercom Capital Group, a global clean energy communications and consulting firm.

According to its latest report on funding and merger and acquisition (M&A) activity for the global solar sector in the first quarter of 2025, the near $5 billion figure represents a 41 per cent decline year-over-year (YoY) compared to $8.2 billion raised through 42 deals in Q1 2024. It noted, however, that, funding was up 20 per cent quarter-over-quarter (QoQ) from the $4 billion raised in 40 deals in Q4 2024.

"The drop in funding this quarter reflects growing investor caution in response to policy reversals, tariff shocks, and regulatory uncertainties that have forced companies and investors to reassess their strategies. But the fundamentals remain strong, and the long-term case for solar is intact. What we need now is clarity and policy certainty to restore confidence in the markets. Despite headwinds in the broader funding environment, we did see an uptick in project M&A in Q1," said Raj Prabhu, CEO of Mercom Capital Group.

Global VC funding for the solar sector in Q1 2025 came to $1.4 billion in 14 deals, a 237 per cent increase YoY compared to $406 million raised in 13 deals in Q1 2024. Funding increased 40 per cent QoQ compared to the $1 billion raised in 21 deals in Q4 2024. The QoQ increase was primarily driven by a single $1 billion raise.

In Q1 2025, debt financing for the solar sector reached $3.5 billion across 23 deals, a 45 per cent drop compared to the $6.4 billion secured in the same number of deals in Q1 2024. On a QoQ basis, debt funding rose 67 per cent from $2.1 billion across 14 deals in Q4 2024.

A total of 19 solar corporate M&A transactions were recorded in Q1 2025, compared to 20 transactions in Q4 2024, and 10 per cent lower compared to 21 solar M&A transactions in Q1 2024.

During the first quarter of 2025, project developers and independent power producers led the acquisition activity, securing more than 8 GW of projects.

Americas

Wärtsilä signs deal to decarbonise Curaçao

Wärtsilä has signed a five-year agreement with Aqualectra, the energy utility company of the Caribbean island of Curaçao to decarbonise the island. The agreement directly ties Wärtsilä's payments to key performance indicators, which include maximising renewable energy use, reducing CO_2 emissions intensity, lowering costs, and enhancing reliability.

Wärtsilä will optimise the energy generation on the island in collaboration with Aqualectra. This will provide a significant step towards Curaçao achieving its target of moving from its current 30 per cent renewable capacity to 50 per cent in 2025 and 70 per cent by 2027.

Wärtsilä will leverage energy storage, grid balancing engines and its GEMS Digital Energy Platform to optimise energy use across the island, in order to maximise existing renewable and fossil-based generation assets and future renewable deployments. The partnership will also see Wärtsilä install a new 38.4 MW grid balancing power plant and a 25 MW / 45 MWh battery energy storage system.

Three gas turbines for Missouri, USA

Springfield City Utilities (CU) has ordered three LM6000VELOX gas turbine packages from GE Vernova for the McCartney Generating Station, located in Springfield, Missouri, USA.

The station currently has a capacity of 100 MW. The addition of these three new units will add a total of 150 MW to the plant capacity. The units are scheduled to start operation in 2027.

The LM6000VELOX can burn two types of fuel, natural gas with fuel oil/diesel as a back-up. The units have a quick start time and can ramp to full power in five minutes, making them suitable to complement intermittent power from renewables.

MOU signed for AP1000 and AP300 projects

Celeros Flow Technology (Celeros FT) has signed an MOU with Westinghouse Electric Company to support nuclear new-build projects in Canada. The agreement offers Celeros FT the potential to design and fabricate valves and pumps for key Westinghouse AP1000 and AP300 projects at its facility in Burlington, Ontario, Canada.

Siemens to supply smart meters for Brazil

Siemens Smart Infrastructure has signed an agreement with CPFL Energia, one of the largest energy distributors in Brazil, for a smart metering project for Brazil's electricity sector. The initiative will replace around 1.6 million conventional meters with smart meters in the state of São Paulo by 2029.

Asia-Pacific

China's longest offshore wind export cable order

Orient Cable has won two export cable contracts in China, one of which involves the supply of a 500 kV line for what the company describes as the longest offshore distance in China's offshore wind so far.

Orient Cable, in a consortium with China Southern Power Grid, has been awarded an EPCI contract for a 500 kV 1 GW EHVAC offshore wind subsea cable for a project in Guangdong Province, China, developed by Energy China. The project has not been named. The project includes two circuits, employs 500 kV 3×800 mm² EHVAC subsea cable for a 92 km-long cable route, and covers the supply, design, engineering, manufacturing, transportation, pre-commissioning, installation and testing.

Orient Cable has also been awarded an export cable supply contract by China Southern Power Grid for what is said to be the longest distance for an offshore wind project in China to date, with the export cable route of around 118 km. The contract involves the supply of a 500 kV HVDC 2500 mm² subsea cable system with a transmission capacity of 2 GW. The project has not been named.

Hitachi Energy and BHEL win HVDC contract

Rajasthan Part I Power Transmission, a subsidiary of Adani Energy Solutions (AESL), has awarded a contract to a consortium comprising Hitachi Energy and Bharat Heavy Electricals Limited (BHEL). The contract will see the consortium design and deliver HVDC terminals for a 6 GW, 950 km HVDC link to transmit renewable energy from the Bhadla area of Rajasthan to the industrial and transport hub in Fatehpur, Uttar Pradesh.

The ±800 kV, 6 GW bi-pole and bi-directional HVDC terminals will help transfer power from the renewable energy zone in Bhadla.

The scope of the Bhadla project includes converter transformers, AC/DC control and protection, thyristor valves, 765 kV/400 kV grid connections, and auxiliary systems to be delivered by Hitachi Energy and its consortium partner BHEL.

Coal India and DVC sign coal power agreement

Coal India and Damodar Valley Corporation (DVC) have entered into a €1.65 billion agreement to build an ultra-supercritical coal fired power plant in Jharkhand, India.

The brownfield project will consist of 2 x 800 MW units, and will be an expansion of the existing Chandrapura Thermal Power Station, which currently consists of 2 x 250 MW units.

The joint venture company will be on a 50 per cent equity sharing basis. Coal for the proposed power plant would be sourced from coalfields close to Coal India's subsidiaries Bharat Coking Coal and Central Coalfields.

The MoU also includes provisions to explore opportunities to jointly develop thermal and renewable energy projects to meet the growing power demand in the DVC valley region.

Wärtsilä renews Attock O&M agreement

Wärtsilä has signed a renewal of its O&M agreement for the 165 MW Attock Gen Limited (AGL) power plant in Rawalpindi, Pakistan. The extension will last for the rest of AGL's remaining 9-year PPA to supply electricity to the national grid.

The plant operates with nine Wärtsilä 46 engines, with heat recovery boilers on each, and one 11.6 MWe steam turbine.

Saleem Anwar, Assistant General Manager of AGL, said: "Wärtsilä has operated and maintained this plant very efficiently since it commenced commercial operations in 2009, and we are pleased to continue this successful arrangement until the end of the PPA."

Europe

Siemens Energy preferred bidder for Sea Link

The UK's National Grid has selected Siemens Energy as the preferred bidder for Sea Link's two HVDC converter stations in Suffolk and Kent.

Sea Link is a proposed 2 GW HVDC transmission system that includes converter stations, one in Suffolk and one in Kent, linked by a 138 km, 525 kV marine cable. Connecting the two parts of the network will create additional capacity in both regions. Sea Link is seeking planning consent and, if successful, will enter construction in 2027.

Mark Pilling, Vice President of Grid Solutions Europe at Siemens Energy said: "Sea Link is another crucial step in our efforts to meet the UK's expanding electricity needs, delivering security of supply and reinforcing our grid – a key part of our energy transition."

Nordex wins 40 MW German wind order

Nordex has won an order from Altus Renewables for eight wind turbines with a combined capacity of 39.9 MW, to be installed at the Seewald wind farm Baden-Württemberg, Germany. The wind turbines will be from the Delta4000 series. The order also includes a 20-year service contract.

The wind turbines are scheduled to be installed from spring 2026. The project consists of a total of seven N149/5.X turbines and one N133/4800 turbine, each with a hub height of 164 m.

In addition, Nordex has won two orders from OX2 in Finland for the supply of 70 N175/6.X wind turbines with a total capacity of 472 MW. The orders also include 35-year contracts for maintenance and servicing of the wind turbines. The wind turbines are for two projects: Honkakangas in Central Ostrobothnia, comprising 16 units and Rajamäenkylä in South Ostrobothnia, comprising 54 units. The wind turbines will be supplied with 162 m-high tubular steel towers and with cold climate adaptations. In addition, the Honkakangas project will be equipped with an anti-icing system for rotor blades. Delivery and installation of the wind turbines will be carried out in 2026 and 2027, and the wind farms are scheduled to be commissioned in 2027 and 2028.

SMRs to be deployed in Estonia

Fermi Energia and Samsung C&T have signed a Teaming Agreement to collaborate on the deployment of two BWRX-300 SMRs in Estonia.

Under the terms of the agreement, Fermi Energia and Samsung C&T will collaborate on deploying the two units for a combined 600 MW of power. The cooperation will include the formation of an EPC partnership, site constructability review, cost estimation, and financing strategies.

As part of the agreement, Fermi Energia and Samsung C&T will work together during the pre-Front-End Engineering Design (Pre-FEED) phase to establish project terms and budget estimates. The Teaming Agreement also outlines plans for a full FEED phase, setting the stage for the regulatory approval and construction process.

The cooperation extends beyond Estonia, as both parties recognise the broader potential of SMR deployment across Northern Europe.

International

Wärtsilä to provide energy storage for Australia

Wärtsilä has won a contract from Octopus Australia to supply a 64 MW / 128 MWh energy storage system for its Fulham Solar Battery Hybrid project. This project is one of the first large-scale DC-coupled hybrid battery systems in Australia's National Electricity Market (NEM).

The project, which pairs the 128 MWh DC-coupled battery with an 80 MW AC solar farm, marks a significant step in Australia's transition to co-locate hybrid renewable energy and storage solutions.

Construction on site has commenced, with completion expected in 2027. Wärtsilä will also provide a long-term service agreement to guarantee the project's continued performance and reliability.

Kuwait awards €150 million O&M contract

The Kuwait Ministry of Electricity, Water, and Renewable Energy has awarded a €150 million seven-year contract to Tenaga Nasional Bhd (TNB) of Malaysia via its wholly owned subsidiary TNB Repair and Maintenance for maintenance works at the Sabiya Power Generation and Water Distillation Plant in Kuwait.

The contract, awarded through a joint venture with Kuwait-based Al Dhow Engineering, will cover maintenance, repair, and overhaul services for the plant, which is located 65 km from Kuwait City.

The power plant consists of four dual-fuelled oil- and gas-fired units with a combined total capacity of 299.4 MW.

Nordex secures 750 MW in Türkiye

Nordex has won two orders totalling 750 MW from a wind energy project developer in Türkiye. Nordex will supply and install 108 N163/6.X turbines for two wind projects from mid-2026, with completion scheduled for 2027.

The name of the customer and location of the wind farms has not been disclosed.

Gas turbine orders for Saudi Arabia

Mitsubishi Power and Doosan Enerbility have won two contracts to supply six M501JAC gas turbines, generators and auxiliary equipment for the Rumah-1 and Al-Nairyah-1 IPP projects in Saudi Arabia.

The Rumah-1 and Al-Nairyah-1 power plants, located in the central and eastern regions of Saudi Arabia, will be developed by a consortium comprising the Saudi Electricity Company (SEC), ACWA, and Korea Electric Power Corporation (KEPCO). The power plants will deliver a combined 3.6 GW.

The M501JAC turbines will be assembled at Mitsubishi Power Saudi Arabia's Dammam factory.

MAN Energy engines for power plant ships

Karpowership has commissioned MAN Energy Solutions to deliver 24 × 18V51/60DF dual-fuel engines for its power plant ships. Each engine will have a capacity of 20.7 MW and will be employed on several barges due to operate globally.

Karpowership's floating power plants are primarily used in various regions of Asia, South and Central America, and Africa.

Hydrogen

New hydrogen import corridor established connecting Oman, Netherlands and Germany

Oman, the Netherlands and Germany have set up a joint venture designed to create the world's first liquid hydrogen import corridor. The hydrogen will be used by European industries and move the EU closer to a renewable energy economy.

Gary Lakes

A corridor designed to transport green liquid hydrogen from the Sultanate of Oman to the Port of Amsterdam, from where it will be distributed to industries in the Netherlands and Germany, is to be established.

A group of Omani and European companies signed up to participate in the joint development agreement (JDA) in mid-April with the intent to create the world's first liquid hydrogen corridor.

A statement posted on the Port of Amsterdam website said: "This supply chain will utilise proven technologies for the liquefaction, transport, storage, and distribution of renewable fuel of non-biological origin (RFNBO) compliant liquid hydrogen." The hydrogen delivered to Amsterdam will meet the criteria set by the European Union in its policy to switch to green, renewable fuels.

The corridor will begin in Oman's industrial port of Duqm, from where frozen hydrogen will be transported on a commercial scale to Amsterdam, from where it will be transported as gas or liquid to users in the area, and to key logistics hubs in Germany, including the port of Duisburg.

Eleven parties in total entered the deal, the statement said. The JVA includes Oman's national green hydrogen orchestrator Hydrom, Omani energy group OQ, Dutch steel producer Tata Steel, German logistics and transportation company Hamburger Hafen und Logistik, and Dutch company Hynetwork. These firms will bring together all the critical links for the envisioned supply chain.

The Greek shipping and logistics company ECOLOG is designing a vessel for the project that will ensure net zero boil-off, eliminating cargo loss during marine transportation. The joint venture partners expect the ECOLOG design to significantly reduce unit freight costs.

ECOLOG's liquid hydrogen midstream services connect low-cost producers with global off-takers. The company is developing the world's first large-scale liquid hydrogen vessels with a capacity to transport 2000 metric tonnes per voyage, as well as storage terminals, regasification and trans-shipment facilities.

The JDA comprises several key components that are vital to the corridor's development and success. It first calls for the development of a centralised liquefaction, storage, and export facility at the port of Duqm. The overall estimated cost of the infrastructure for the project was not mentioned in the statement.

The partners must also discuss and decide upon pricing and delivery to off-takers in the broader Amsterdam area, and also for off-takers located elsewhere in the Netherlands and Germany. The innovative energy transition company, EnBW, will serve as aggregator. The German company recently commissioned one of Germany's first hydrogen-ready gas turbine power plants at a site in Stuttgart-Munster.

The JDA also outlines the aligned development of dedicated infrastructure throughout the corridor, including export and import facilities in the ports of Duqm, Amsterdam and Duisburg, as well as for several distribution modalities for gaseous and liquid hydrogen, most notably gas pipeline networks, rail connections, and barge distribution via the Netherlands' extensive canal network.

The agreement was announced on April 16, during a state visit by the Sultan of Oman to the Netherlands. During the 2023 COP28 meeting in Dubai, the government of Oman and state-owned Hydrom signed a memorandum with the Port of Amsterdam, Zenith Energy Terminals, and Greece-based shipping company GasLog regarding the development of a liquid hydrogen supply chain from Oman to Europe.

"This agreement represents a landmark moment in our commitment to clean energy," Sophie Hermans, Minister for Climate and Green Growth in the Netherlands, said in the statement. "By linking Omani green hydrogen with Europe's energy needs, we are advancing our shared climate goals and creating a sustainable energy pathway."

Salim Nasser Al Aufi, the Omani Minister of Energy and Minerals, said: "This partnership reflects Oman's commitment to playing a leading role in the global green hydrogen economy, while strengthening ties with Europe to support its sustainable clean energy transition."

In December 2024, during a visit to Belgium by the Sultan of Oman, Hydrom signed a memorandum of understanding (MoU) with the Belgian Hydrogen Council. The MoU covers the partnership and collaboration of Oman and Belgium in joint research and industrial partnership for establishing a regulatory framework to support hydrogen import and distribution through Belgium into Europe.

The agreement follows previous agreements, including the Hyport Duqm project being developed by Belgian offshore energy and dredging contractor DEME, Omani energy company OQ, and UK energy major BP.

DEME and partners plan the production of green hydrogen into green ammonia using both wind and solar energy sources. The project will have a combined generating capacity of around 1.3 GW under Phase 1 and possibly more than 2.7 GW upon the completion of Phase 2.

Gas

Natural gas seen as main electricity source as AI grows

While it is uncertain where it will lead, Artificial Intelligence is something that many experts predict will be a force that will change many things. But in the process of that change, one thing is certain: AI demands a lot of energy, and that energy will come not so much from renewables, but from natural gas.

Gary Lakes

Artificial Intelligence (AI) is at the forefront of our technical revolution. Some experts speak of profound changes in everything from industry, medicine and agriculture, to transportation, while others express fears that AI will irreparably damage economies, social structures and individual lives.

One of the many things that AI is predicted to do is find solutions to our energy problems, but in doing so it will need a lot of energy.

According to a new report by the International Energy Agency (IEA), more than 1000 TWh will be needed by 2035 to meet the demands of AI. That demand will be one of the main drivers in the US for new power generation plants and new power generation worldwide.

"After many years of relatively flat demand, the US power system is witnessing significant growth," according to an article that was published in *The National Interest* last month. "There is no doubt that the AI revolution is a big part of that paradigm change and excitement, but not all energy sources are equally suited to the task and timelines."

According to the publication, turbines that burn highly monitored and low-emissions domestic natural gas can provide stable, dispatchable power, making them the optimal choice for data centre operators either as grid backup or in a 'behind the meter' play.

The energy consultant group Enverus predicts up to 80 new gas powered plants, adding some 46 GW of capacity, will be built in the US by 2030, the publication reports. That is more than 20 per cent of what the US added during the last five years, and is equivalent to the size of Norway's entire electrical system.

For now, with other power generation systems moving at a slower pace and unable to come into operation at the rate AI power demand is growing, natural gas is expected to fill that burgeoning demand.

Infrastructure logistics will be a big factor in supplying gas to generation facilities and studies have been undertaken to identify regions in the US power grid structure that are capable of bearing additional loads, and identifying strategic locations for AI data research centres. Several big US energy firms have already expressed intentions to supply the data centres with power generated by natural gas.

The new IEA report said AI has the potential to transform the energy sector over the next decade, and that this surge in demand for energy to power AI research will occur on a global scale. AI will unlock significant opportunities to cut costs, enhance competitiveness and reduce emissions, the IEA said.

As mentioned, the IEA's special report, titled 'Energy and AI', forecasts that "electricity demand from data centres worldwide is set to more than double by 2030 to around 945 TWh, slightly more than the entire electricity consumption of Japan today. AI will be the most significant driver of this increase, with electricity demand from AI-optimised data centres projected to more than quadruple by 2030."

The report draws several interesting conclusions. It says that driven by AI use, "the US economy is set to consume more electricity in 2030 for processing data than for manufacturing all energy-intensive goods combined, including aluminium, steel, cement and chemicals."

Furthermore, it says that in advanced economies more broadly, "data centres are projected to drive more than 20 per cent of the growth in electricity demand between now and 2030, putting the power sector in those economies back on a growth footing after years of stagnating or declining demand in many of them.

Clearly this is suggesting that the growth made by renewables in some countries at the expense of natural gas is likely to decline by comparison in the years ahead.

The report emphasises the significant uncertainties that remain, from the macroeconomic outlook to how quickly AI will be adopted, the IEA said in a statement announcing the release of the report. The report also notes questions over how capable and productive AI will become, how fast efficiency improvements will occur, and whether bottlenecks in the energy sector can be resolved.

"AI is one of the biggest stories in the energy world today", the report quotes IEA Executive Director Fatih Birol as saying, "but until now, policy makers and markets lacked the tools to fully understand the wide-ranging impacts".

"With the rise of AI, the energy sector is at the forefront of one of the most important technological revolutions of our time," Dr Birol said. "AI is a tool, potentially an incredibly powerful one, but it is up to us – our societies, governments and companies – how we use it."

He also noted that while the energy sector will shape the future of AI, AI will at the same time shape the future of energy.

What do fractured geopolitics mean for the future of energy?

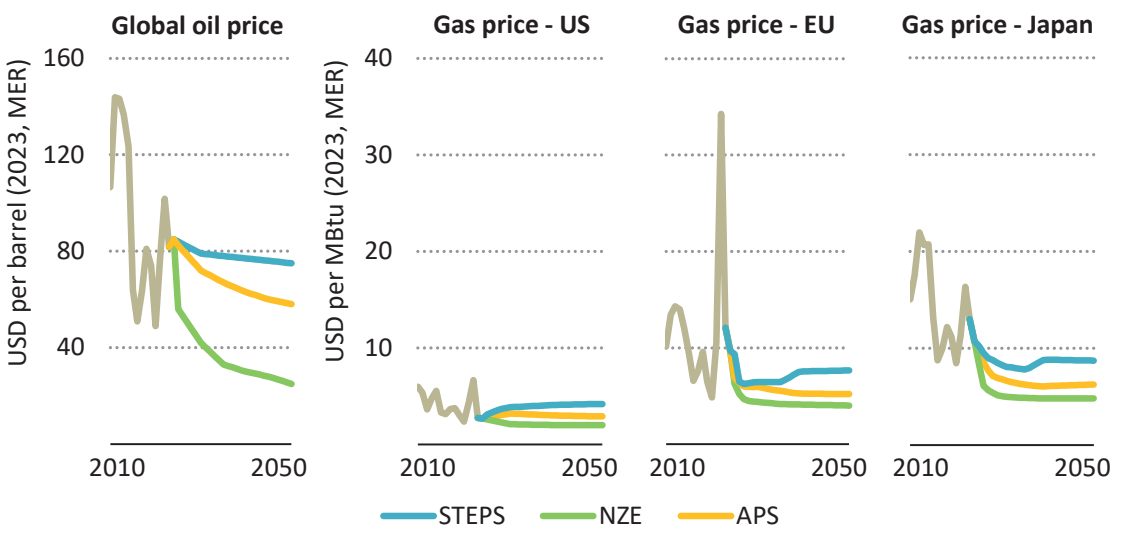
For more information, please contact:

IEA Publications
International Energy Agency

Website: www.iea.org

Contact information:
www.iea.org/contact

Oil and natural gas price by scenario, 2010-2050

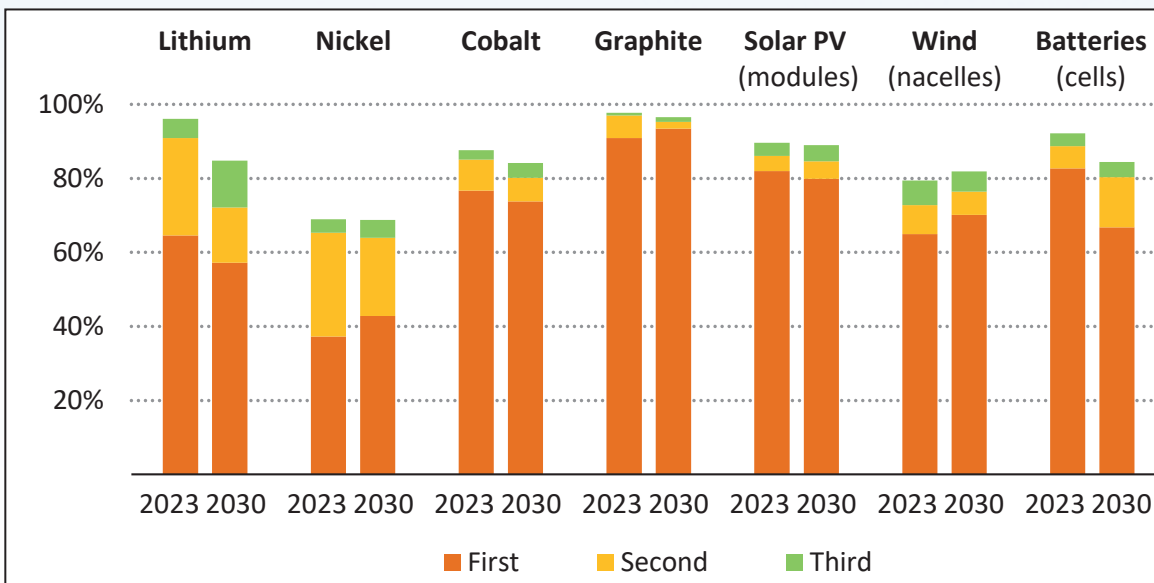


Relatively smooth trajectories for oil and gas prices belie historical volatility; the major variations arise between scenarios with different degrees of climate ambition

Notes: MER = market exchange rate; MBtu = million British thermal units; US = United States, EU = European Union.

World Energy Outlook 2024, © IEA/OECD, page 31, Figure 1.6

Share of top-three suppliers of selected critical minerals and clean technologies based on announced projects, 2023 and 2030



Announced projects indicate that the geographic concentration of critical minerals and clean energy technology manufacturing is set to remain high through to 2030

Note: Critical minerals data are refined material production.

World Energy Outlook 2024, © IEA/OECD, page 33, Figure 1.7

Source: *IEA World Energy Outlook 2024, https://www.iea.org/reports/world-energy-outlook-2024, CC BY 4.0*

Gearing up for growth in the face of headwinds

Last month, WindEurope held its annual conference and exhibition in Copenhagen. **Junior Isles** later caught up with Hitachi Energy's Maxine Ghavi to hear her key takeaways.

April 8-10 saw more than 16 000 visitors attend what is Europe's biggest conference and exhibition for the wind power sector. With Europe facing unprecedented competitiveness and security challenges, it was a timely gathering.

Europe has ambitious targets for new renewables capacity, the bulk of which is planned to come from wind. Wind provides 20 per cent of the electricity Europe consumes today; the EU wants it to be 35 per cent by 2030 and over half by 2050.

Having installed 16.4 GW of new wind power capacity in 2024, according to WindEurope – the organisation representing the region's wind power sector – Europe now has 285 GW of wind power capacity: 248 GW onshore and 37 GW offshore. The EU-27 accounts for 231 GW of the total installed capacity, 210 GW onshore and 21 GW offshore.

WindEurope expects Europe to install 187 GW of new wind power capacity over 2025-2030, with the EU-27 installing 140 GW of this – 23 GW a year on average. This would bring total installations in Europe and the EU to 450 GW and 351 GW, respectively by 2030. Notably, Europe will need to add 15 GW/year of offshore wind by 2030. It is a tall order, but it is what is needed if the EU is to achieve its targets for decarbonisation and energy security.

Fresh from the Copenhagen event, Maxine Ghavi, Hitachi Energy's Head of Europe, commented on the headwinds facing the sector and the challenges Europe faces in achieving its ambitions for offshore wind.

Ghavi: The main takeaway was that the fundamentals have not changed

"Overall, there were a lot of valuable discussions at WindEurope," she said. "[But] The main takeaway was that the fundamentals have not changed. The energy trilemma – energy security, affordability and sustainability – is [still] there. And su ply chain was, of course, a topic – can we achieve the targets when considering supply chain constraints?"

Although the global wind power industry has been growing strongly for decades, over the last few years wind capacity additions have been held back by a combination of global macroeconomic challenges such as high inflation and cost of capital, as well as domestic policy barriers. However, it is now experiencing massive growth, which presents a new set of problems.

Ghavi said that the sudden growth has really "caught everybody off-guard", noting: "As an industry, we hadn't really built for that capacity." Companies like Hitachi Energy have therefore been investing in building up manufacturing resources and creating framework-type agreements with project developers in order to accelerate the building of the infrastructure needed to connect wind farms to the grid.

Commenting specifically on the supply chain issues, Ghavi cited what she sees as perhaps the top two concerns. "It isn't about a product or a box that has to be delivered. We are a supplier to our customers, and we have multiple suppliers that we have to manage and deal with. So, it's simply the capacity, number one… The decisions as an industry and as suppliers we were making five years ago wasn't in terms of capacity because in some cases for a period of time, capacity in the market actually decreased. We're now back in that swing where we are all expanding capacity."

Accordingly, Hitachi Energy has been making investments globally, with plans to spend $9 billion from 2020-27. "A significant portion of that is for Europe," said Ghavi. "We already have a lot of factories. We're focusing quite a bit on brownfield vs greenfield, because that's the faster way to respond to have the capacity up and running."

Hitachi Energy is also working with its customers on the approach to projects and contracts.

"The business model has changed from transactional to partnerships and strategic, because there is no way that any single company can do this alone along the value chain," said Ghavi. "So, this gives us the visibility so that we can then go back and build around that visibility to make investments in capacity expansion, people, R&D, engineering, project execution and service.

"The visibility horizon we were discussing with our customers up until 18 months ago was 5-10 years; now we are talking 10, 15, 20 years… Planning really needs to be done holistically as clusters, as a region, to address the challenges."

Further, this level of planning needs to be considered along the entire value chain – from technology, to project execution, to attracting people and talent. Ghavi noted that Hitachi Energy has increased its workforce from 2020-2024 by 20 per cent and plans to hire an additional 15 000 people by 2027.

Hiring also comes with its challenges, as Ghavi explained. "It takes time to expand [manufacturing capacity]. And it also goes back to people: they have to be trained. You can't hire 15 000 people over a three-year period and not be concerned about things like health and safety, and integrity."

In addition to ramping up manufacturing capacity and adding personnel, the other top issue in terms of supply chain challenges, according to Ghavi, is the raw materials used in products. Hitachi Energy therefore has to share visibility with its suppliers, in the same way it does with its own customers.

"We do frame agreements and capacity reservation agreements with our customers, and we have to do the same thing with our critical supply chain as well," explained Ghavi. She added: "Having a global footprint where we can leverage a global supply chain and manufacturing also helps us in the process of sourcing from different places and being able to manufacture in different places, while following the same methodologies."

Asked whether there were specific concerns in terms of the raw materials supply chain, Ghavi noted the availability and price volatility of copper as an example. "It goes back to whether we have enough supply and that we have it reserved so that we can leverage."

An important aspect, often overlooked in meeting targets for actual wind power generation targets, is service. It is an area where Ghavi says Hitachi Energy has "really put a stake in the ground" with the appointment of its new CEO.

"We've always focused on service but now we have taken it to the next level. There is now a business unit that is 100 per cent dedicated to service," she said. "Service is a great opportunity but we also have a responsibility to extend the lifetime of the existing installed base. This will make what is already installed more sustainable. That helps the capacity and our customers… it's about getting more out of that asset."

Certainly, adapting business models and expanding capacity resources is part of the equation but there is still much the industry needs to do as a whole. Vestas, Europe's largest wind turbine manufacturer recently warned of a large gap between the ambitious targets set for the industry and the reality on the ground.

Anders Runevad, Chair of Denmark's Vestas, recently told the *Financial Times*: "There is a fairly big discrepancy between the ambitious political targets that have been set and then you translate that to what's actually happening. We're definitely behind that curve."

He said streamlining the process of securing permits was just one of the changes needed to boost an industry that many countries are relying on to meet their net zero carbon emissions targets.

At the start of the Copenhagen event, WindEurope issued what it called the 'Copenhagen Call to Action', highlighting three steps to boost Europe's energy independence and competitiveness.

The call to action noted that the European wind energy supply chain is growing to deliver on the increased wind volumes Europe needs. It is currently investing over €11 billion in new factories to meet the Clean Industrial Deal goals. "But Europe isn't building enough new wind farms to support its competitiveness and energy security objectives" it said. The main reasons are poor permitting, slow grid build-out, bad auction design and insufficient electrification.

The industry therefore called on governments to:

- Apply the new EU permitting rules, noting that "they work wonders" – Germany is now permitting 7x as much onshore wind as five years ago. And filter out zombie projects from grid connection queues, which are "clogging up the system".
- Remove barriers to electrification. Let industry get state aid to electrify with renewable PPAs, which are not just for onsite power. Remove non-energy taxes and charges from electricity bills so renewables become "an obvious choice for consumers".
- De-risk wind investments with a stable pipeline of 2-sided Contract for Difference auctions. CfDs improve costs of capital and visibility on revenues and are good value for governments.

Henrik Andersen, WindEurope Chairman, summed up: "Europe is in a moment of transition. To secure European influence in the global economy, we need more secure, affordable and sustainable energy. Wind energy is already driving industrial growth and energy independence across Europe, we just need to scale up."

Japan's clean power push: global capital meets local ambition:

This is the latest in a series of country analyses, where ***TEI Times*** looks at Japan's generation and consumption profiles, policy, emissions targets and investment attractiveness.

Electricity generation declined 2.6 per cent in 2023, with non-fossil fuel generation falling and clean energy generation rising

The clean energy revolution in Japan is gathering momentum, and both domestic giants and foreign heavyweights are driving the shift. With bold offshore wind targets and solar growth surging, investors are eyeing opportunities – despite policy hurdles and currency risks.

Decarbonisation commitments

Climate action in Japan has been slow but has improved in recent years. It pledged in 2015 to reduce greenhouse gas (GHG) emissions by 26 per cent from 2013 levels by 2030. This was raised in 2020 to 46 per cent by 2030 and net zero by 2050. A 2021 energy plan and a bill passed in 2023 aimed to raise the share of clean energy in the energy mix. They projected non-fossil fuel sources to account for 59 per cent of the total mix by 2030, up from 31 per cent in 2022. Renewables would increase to 36-38 per cent and nuclear to 20-22 per cent, while fossil fuels would fall to 41 per cent from 69 per cent.

The nation continues to face energy sector challenges typical of island nations with few or no natural resources. It is therefore heavily reliant on imported fossil fuels, complicating its energy security – especially given the geopolitics of being a neighbour to China. Its historically fragmented electricity network also limits efficient power distribution. In terms of expanding clean energy generation, project development has been slow, constrained by lengthy approval processes and geographic limitations such as mountainous terrain. Critics have flagged Japan's controversial reliance on unproven technologies such as carbon capture and storage and ammonia co-firing.

Energy mix

Japan's electric power generation in 2023 highlights the substantial ongoing shift in its energy landscape. Electricity generation declined 2.6 per cent, with non-fossil fuel generation falling and clean energy generation rising, according to the '*Energy Institute's Statistical Review of World Energy 2024*'. Clean energy output jumped 10.5 per cent, thanks to increases of almost 50 per cent from nuclear power and 8 per cent from other renewables, including solar and wind.

Year to 31 December 2023	TWh	Change (%)
Total Generation	**1,013.3**	**-2.6%**
Clean energy Generation	**354.7**	**10.5%**
Nuclear energy	77.5	49.6%
Hydroelectric	74.5	-0.5%
Other Renewables	149.0	7.8%
Other	53.7	-4.1%
Non-Renewable Generation	**658.5**	**-8.5%**
Oil	33.4	-21.4%
Natural Gas	320.9	-8.7%
Coal	304.3	-6.6%

Source: Energy Institute (ed), 'Energy Institute Statistical Review of World Energy 2024' (2024) <https://www.energyinst.org/statistical-review/home> accessed 22 April 2025

Japan offers investors a solid investment profile, with robust economic fundamentals and a strong commitment to innovation

Japan's energy mix reflects a complex dynamic between historical disruptions and decarbonisation initiatives. The Fukushima Daiichi nuclear power plant disaster in 2011 prompted the shut down of all the nation's nuclear reactors, many of which are still offline. While progress has been slower than expected, clean energy generation has shifted the energy mix. The country commissioned about 20 GW in solar capacity and a little over 1 GW in wind power in 2020-2024. While net installed capacity hardly increased in recent years, additions may accelerate in the near future. This is driven by the Ministry of Economy, Trade and Industry's expectation electricity demand will rise sharply by 2050 – by 30-50 per cent – driven by electrification in transport, industry, and heating, as well as digital infrastructure such as data centres.

Investment environment

Japan offers investors a solid investment profile, with robust economic fundamentals and a strong commitment to innovation, particularly in clean energy. The country enjoys financial stability, reflected in upper-medium grade sovereign credit ratings – Moody's assigns an A1 rating with a stable outlook, and S&P an A+ rating, also with a stable outlook. Japan ranks 13th out of 133 countries on the Global Innovation Index, underscoring its technological and research strength. This extends to the renewable energy sector, where Japan ranks 10th on the EY Renewable Energy Country Attractiveness Index.

Beyond these indicators, Japan maintains a balanced institutional environment. It ranks 20th on the Global Corruption Perceptions Index and 14th on the World Justice Project Rule of Law Index, indicating a relatively transparent and lawful governance system. However, challenges remain – its 70th place on the Reporters Without Borders Press Freedom Index suggests areas for improvement in media openness.

Two other key considerations for investors are currency volatility and interest rates. The Japanese yen has fluctuated significantly in recent years, rising from just above JPY100 to the US dollar in late 2020 to over JPY160 in June 2024. As a result, foreign investors often need to hedge currency risks, increasing costs. On the other hand, borrowing in yen remains cheap: the interbank rate is around 0.8 per cent, far lower than in any major developed economy.

Policies and incentives

Japan's key net zero policies include the 'Green Growth Strategy' (2021), which identifies 14 high-growth sectors, and the 'GX Promotion Act', which introduced growth-oriented carbon pricing and climate transition bonds. The Strategy highlights critical energy-related industries such as offshore wind, solar, geothermal, and next-generation heat energy. It also promotes the development of EV and battery industries.

To support this transition, the Ministry of Economy, Trade and Industry created a JPY2 trillion ($14.1 billion) fund to "provide continuous support for R&D projects, demonstrations, and social implementation projects for up to 10 years to companies that commit to ambitious goals". The 'Basic Hydrogen Strategy' (2017), updated in 2023, targets 12 million tonnes of hydrogen supply by 2040. Nuclear power is being reinforced by extending reactor lifespans to 60 years. Tax incentives include deductions for energy-efficient equipment and renewable energy investments.

However, significant contradictions persist. Japan's fossil fuel subsidies totalled $77 billion from 2022, undermining decarbonisation goals by discouraging EV adoption and renewable energy expansion. CCS and ammonia co-firing remain costly and largely unproven. Additionally, permitting and regulatory hurdles continue to delay renewable project rollouts. Japan's climate finance contributions are rated "highly insufficient", posing further obstacles to international climate cooperation.

Investors backdrop

Japan has a robust mix of domestic and international investors in its clean energy sector, particularly in solar and wind. The market gained momentum after the 2012 introduction of the Feed-in-Tariff scheme. Leading domestic investors include trading houses such as Marubeni, Mitsubishi, Mitsui, and Sumitomo, as well as utilities like JERA (a Tepco-Chubu Electric joint venture), Kansai Electric, and Tepco, all of which are actively expanding their clean energy portfolios.

Foreign investors have also entered the market in force. Notable names include Denmark's Ørsted, Germany's RWE, and Norway's Equinor, typically in partnership with domestic firms to develop offshore wind capacity. The offshore wind sector has become particularly active. For example, in December 2024, Japan's industry and land ministries selected two consortiums to develop offshore wind blocks in the third major public auction round. One consortium – comprising JERA, Green Power Investment, and Tohoku Electric – won a 615 MW project off Aomori Prefecture. Another consortium, including Kansai Electric, Marubeni, Marutaka, Tokyo Gas, and BP, secured a 450 MW project off Yamagata Prefecture. Both projects will use Siemens Gamesa turbines and are scheduled to begin operations in June 2030.

Meanwhile, RWE and Kansai Electric are awaiting environmental approval for a proposed 600 MW offshore wind farm near Hokkaido. A growing concern for offshore investors is the rising cost base against fixed auction prices – driven in part by the weakened yen, which makes imported turbines more expensive. This is one of several policy and financial challenges that authorities must urgently address.

Prepared for The Energy Industry Times by Joseph Jacobelli, Managing Partner, Asia Clean Tech Energy Investments Ltd.

RENEWABLES INVESTMENT COUNTRY PROFILE	RANK/RATING	YEAR	SOURCE
Business & Finance			
Moody's sovereign credit long term rating (Outlook)	A1 (Stable)	2023	countryeconomy.com/ratings
S&P sovereign credit long term rating (Outlook)	A+ (Stable)	2020	countryeconomy.com/ratings
Global Innovation Index	13/133	2024	wipo.int/global_innovation_index/
EY Renewable Energy Country Attractiveness Index 40	10/60	2024	ey.com
Other			
Global Corruption Perceptions Index	20/180	2024	transparency.org/
Reporters Without Borders Press Freedom Index	70/180	2024	rsf.org/en/index
World Justice Project Rule of Law Index	14/142	2024	worldjusticeproject.org/rule-of-law-index/

Modular geothermal opens new opportunities

A new technology developed by Geothermal Gradient could redefine the geothermal energy landscape. Having demonstrated the ability to convert waste heat from existing oil and gas operations into renewable power without the need for any new drilling, this modular, mobile system also has the potential to help satisfy the needs of the fast-growing, power-hungry data centre market. **Junior Isles** explains.

Geothermal energy can provide clean, renewable, baseload electricity, but it has its challenges. Upfront project costs are high due to the need to drill and explore potential sources and, in some parts of the world, projects can be subject to lengthy permitting periods. In the US, for example, it can take up to seven years to obtain the necessary permits for a geothermal project. This long permitting time delays the start of energy production and adds to the overall cost of the project.

The technology is also limited by geography. Geothermal resources are often located in specific regions with high geothermal activity, such as Iceland, Indonesia, the Philippines, and specific locations in the western United States.

Consequently, uptake has been limited. According to the International Energy Agency's most recent report on the sector, geothermal meets less than 1 per cent of global energy demand and its use is concentrated in a few countries with easily accessible and high-quality resources. It says, however, that with continued technology improvements and reductions in project costs, geothermal could meet up to 15 per cent of global electricity demand growth to 2050. This would mean the cost-effective deployment of as much as 800 GW of geothermal power capacity worldwide, producing almost 6000 TWh annually, i.e., equivalent to the current electricity demand today of the US and India combined.

In recent years there have been several innovations that could go some way to making this possible, one of the most interesting being one from Geothermal Gradient. The US-based company has developed an innovative system that is bringing geothermal energy to the oil and gas sector, with the potential to also power the rapid global expansion of data centres.

Known as the HXC system, it is essentially a system that conveys heat from generally dirty wastewater sources for use in an organic Rankine cycle (ORC) for power generation.

Benjamin Burke, CEO of Geothermal Gradient, explained the roots of technology. "The whole idea, for this started with my previous work in the oil and gas industry as a geoscientist, and seeing the opportunity that was all around the industry, in the form of heat waste. Fluids were constantly being produced and cooling off on the surface… I realised there was an opportunity in the thermal side of water and that's where the spark for the company really came from.

"I was one of the company's co-founders in 2020. The HXC system itself came from the need to connect ORC units to oil and gas facilities… We needed to convey heat from a generally dirty fluid stream, something that certainly contains scale, oil, gas, high brine content, and in some cases rags and plug parts. But we needed to convey just the heat to the ORCs and most ORCs require very clean water. That's where the idea of the HXC came from."

The system has two key components. One is the HXC sled to convey heat from a produced fluid stream to the ORC. The second sled is the ORC itself, and Geothermal Gradient is able to adapt any off-the-shelf ORC to work with a dry air cooler.

"It's a water-free cooling mechanism, which has water in its loops, but doesn't consume any water, said Burke. "The two units can come off a lorry or truck and be installed in one day. And we can do that in any rural location in the world."

He notes that the same sled concept can really be used in a number of ways. The company has in fact had a good amount of interest from oil and gas operators all over the world.

The units are also sized so they can be installed as small modules, according to the operator's needs. Each sled can produce anything from 75 kW to 300 kW using different sized ORC generators.

"The modularity is what our clients really like about it," said Burke. "Along with that ease and quick installation, we have the mobility. So, if an oil and gas well site only flows the right amount of fluid for a year or two, the modularity means that we can move it on to the next site."

The system needs fluid at a temperature of at least 70-75°C to operate, and 2000 barrels/day to make a reasonable amount of power. "The more the merrier in terms of both temperature and fluid flow, to get more power," noted Burke.

A handful of projects have already been completed or are underway in the oil and gas sector and more are on the way. Geothermal Gradient's first system was at a pilot project in Nevada, in the western United States, while its first commercial installation is with an oil and gas operator in the Williston Basin in western North Dakota. The second commercial project is due to start up this month (May) in western Louisiana.

Burke added: "We're very excited to work on a project in Argentina, which will hopefully be kicking off later this calendar year, as a well as a project in Oman at a steam flood field."

The technology is now also garnering interest from geothermal operators and data centre operators.

Burke explained: "We've had five different geothermal operators approach us in the last four months… Some geothermal operators are operating and drilling, and planning to have larger facilities. Our equipment can help them to get to first electrons very quickly and test some of their wells. They are looking to use us, while their large more bespoke multi-megawatt power units are in construction."

But it is the growth of data centres, driven by the advance of artificial intelligence, that makes the future even more exciting. The HXC system is well suited for deployment at liquid-cooled data centres. These data centres typically have processors sitting in a bath of water or some form of refrigerant. This heat from the processors is pumped outside the building, usually to a fluid chiller and cooled off.

"Our equipment, in making power, can act as that fluid chiller," said Burke. "Additionally, we can use ground loops – just like a thermal energy network or a district heating network would have a ground loop for rejecting heat to the subsurface. So, a data centre is essentially a building with a pipe of hot water coming out of it, which to our equipment looks a lot like an oil and gas well and we can cool that fluid stream just as we could cool an oil and gas well.

According to Burke, the company has received "a lot of initial excitement" over the idea of a water-free solution for data centre cooling. This is important since many of the existing cooling solutions for water-cooled data centres involve some type of misting, or evaporative cooling, which can be a problem in parts of the world where water is scarce.

According to Burke, the economics of the technology also stack up well, versus current solutions. This he says, goes hand-in-hand with emissions savings of about 0.5 kg (1 lb) of CO_2 for every kWh, when compared with savings against the grid. This roughly doubles for diesel installations.

Geothermal Gradient has initially adopted a lease model for HXC, which is well suited to the modularity of the system.

Burke noted: "Although we certainly can sell the units, we've started as a leasing model because a lot of oil and gas operators tend not to own the heavy equipment that they use – they tend to lease the drill rigs and a lot of equipment that goes onto a site. So, the idea of leasing our geothermal equipment fits very cleanly with their business model."

The lease approach also makes HXC cost competitive with existing solutions. "In leasing these units, [compared to] the incumbent solution that we are replacing, we are essentially one-to-one or slightly less expensive than the amortisation cost of the fluid chillers that operators currently use," said Burke. "Plus, they get power [from the HXC system], as opposed to pulling power from the grid. Or even worse, from an emissions standpoint, using diesel generation for the power. Compared to the incumbent solutions there is about a 10-20 per cent [cost] saving for oil and gas operators."

He explained that a one-off solution for a client is not the most cost-effective option but noted: "At a full build-out we're on the order of 8-11 cents/kWh, when power generation is the goal." Burke added: "If heat rejection is the goal – for a lot of our clients, fluid chilling is the primary goal – whatever they get from that is secondary. So there, you have to equate the cooling duty of the solution along with the kilowatt hours of electricity produced, and you still end up with about the same number… that's a very competitive number for a baseload power solution."

As long as water is flowing, day or night HXC can make power and provide cooling duty. With a capacity factor above 90 per cent, this compares very favourably with solar at 20-25 per cent or wind at 30-40 per cent. "When this capacity factor is normalised against the levelised cost of energy, we're as cheap as wind and solar, if not more so," said Burke.

The technology certainly has a bright future. As Burke summed up: "We're really excited about the opportunities to take advantage of thermal resources that are being produced every day and have that advantage work for our clients, work for ourselves, and in some cases work for public entities where the wells are in the public domain. It's been gratifying to see that interest truly worldwide in the uptake of our technology."

Geothermal Gradient has completed its first commercial installation at a Chord Energy well-pad in North Dakota, USA

Junior Isles

Go clean, stay secure

For fear of repetition, I seldom re-visit a topic twice in a row. But sometimes, needs must. Late last month, the International Energy Agency (IEA), in collaboration with the UK government held 'The Future of Energy Security' summit in London – a topic whose importance cannot be overstated.

The summit was held to examine the geopolitical, technological and economic factors affecting energy security at the national and international level. Hailed as the first conference of its kind on the future of energy security, the political importance of the meeting was clear. Along with over 50 major energy companies, more than 60 governments attended the meeting – at a time when there is increasing geopolitical fragmentation.

When the summit was announced last August, the aim was to define energy security in the 21st century – certainly the definition has changed post-2022 following the energy crisis exacerbated by Russia's invasion of Ukraine and the subsequent physical attacks on energy infrastructure.

According to Dr Fatih Birol, Executive Director of the IEA, there were a few key conference takeaways from the IEA's perspective. Despite having different priorities and perspectives, energy policies and national pathways, there was "a readiness" to engage and cooperate on energy issues.

"They all recognise that we are entering a new era of energy security," said Dr Birol. "I say new era because countries agreed that we still have to pay utmost attention to traditional energy security risks, such as oil and gas, but at the same time the emerging energy security risks such as critical minerals and supply chains."

With the expansion of clean energy technologies such as renewables, electric vehicles, battery storage, etc, critical minerals and supply chains are becoming increasingly important. Countries agreed that there is no national security without energy security. "This is one area where I can say we had full consensus," noted Dr Birol.

With countries becoming more interconnected and interdependent most governments recognise that, as Dr Birol put it, "no country is an energy island today". The clear correlation between UK electricity prices and gas prices, even on an island like the UK, is clear evidence of this.

Making his own reflections on the conference, UK Secretary of State for Energy Security and Net Zero, Ed Miliband, stressed that clean energy was no longer just about climate change, but that clean energy and energy security are now linked.

He said: "I believe this summit marks the coming of age of the era of clean energy. For the UK government, that era of clean energy is the rock on which global security and prosperity can be built."

He added: "In a world of fragmentation, there is huge value in multilateralism – in countries working together for their own national interests… In the years since Russia's invasion of Ukraine, many countries have experienced what the UK has, due to their exposure to fossil fuels and the weaponisation of energy… It's clear that countries feel that they can benefit individually from accelerating the clean energy transition. Because the lesson of what has happened in the past is that the cost of solar and wind has fallen dramatically, in part because of the increase in deployment. One thing is clear to me, and that is that this clean energy transition is an unstoppable transition."

Although China was not represented at the London summit, at a UN meeting two days earlier, President Xi Jinping said his country would "not slow down its climate actions" and noted that the country had "built the world's largest and fastest-growing renewable energy systems as well as the largest and most complete new energy industrial chain".

But while most countries around the world agree that clean energy – renewables and nuclear – is the best way forward, at the summit the US, under the Trump administration, was vocal in its support for fossil fuels.

Tommy Joyce, Acting Assistant Secretary at the US Department of Energy, declared in a plenary session that the goal of reaching net zero greenhouse gas emissions by 2050 was "harmful and dangerous", and warned of "putting abstract emission goals in the interests of our adversaries first and the security of our people last".

During the press questions and answers session at the London summit, one journalist asked whether Joyce used the opportunity of meeting with Miliband to tout oil and gas for the UK, or to attack climate policies. "Apart from warm words" about the energy transition, she argued that there were few concrete outcomes.

Miliband avoided discussing the conversations he had with Joyce and instead offered more warm words about the energy transition.

Just ahead of the London summit, during a webinar organised by the Energy & Climate Intelligence Unit (ECIU), panellists were more forthcoming on questions related to dialogue between the US and this side of the Atlantic.

With the move away from Russian gas, the UK, and indeed the broader EU, has been forced to look elsewhere. But in the new geopolitical landscape they are finding that sourcing new gas can come with strings attached.

Commenting on the headlines around the US, the EU, and how tariffs are impacting the trans-Atlantic relationship, Sarah Brown, Europe Programme Director, Ember, said: "The main focus has been around the $350 billion of LNG, which the US is saying that Europe must take to cover its trade deficit. Europe already takes 45 per cent of its LNG from the US, and that is valued at about $13-18 billion per year. So how you can accommodate $300 billion/year is quite difficult to fathom."

Even if the EU imported all of its gas from the US, Brown says this would only equate to around $30-35 billion per year.

While the European Commission has indicated that while it might buy more US gas in the future, anything it agrees to must be aligned with its green objectives, and that European environmental policies and standards are not up for debate.

The EU, through its REPowerEU programme has a target to reduce gas demand by 50 per cent by 2030, which according to Ember's calculations means the bloc is unlikely to take anything more than $13-18 billion of US LNG.

The situation in the gas market is complex. Historically in the face of oil price volatility Europe increased reliance on natural gas, which was relatively secure. With the souring of relations with Russia, this is no longer the case, creating other problems for the bloc.

Weighing in on the debate, Michael Bradshaw, Professor of Global Energy, Warwick Business School, University of Warwick, Associate Fellow, Chatham House, said: "As we have seen in a relatively short period of time, Europe has been able to pivot away from the traumatic reduction in supply of Russian gas but has become increasingly dependent on the global LNG market… Europe has been very lucky, in that the previous two winters have been mild… but LNG has now become geopolitical because it has also been caught up in the tariff wars between Washington and Beijing."

Interestingly, he seemed to caution against putting too much reliance on renewables, at least in the immediate future, especially for the UK.

"I would guard against seeing the green energy plan as being a solution to UK gas security because the majority of gas demand for the UK lies outside the power sector. And the reality is, in the coming 5-10 years we will still need natural gas as a source of flexibility," said Bradshaw.

On this he has a point. But ultimately, the UK and Europe's decision to back clean energy will reap rewards in terms of environment, affordability, energy security and therefore national security.

Cartoon by Jem Soar