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The storage revolution

As renewable energy capacity surges, the demand for scalable long-duration energy storage to provide reliability and flexibility has never been more critical. *Page 12*

A road to hydrogen?

Can carbon capture, utilisation and storage facilitate the production of low carbon hydrogen from natural gas in the near term – and at reasonable cost? *Page 13*

Final Word

It's time to ease the transmission gridlock, says Junior Isles. *Page 16*

News In Brief

Welcome boost for wind energy manufacturers
The European Investment Bank (EIB) has reached a €500 million counter-guarantee deal with Germany's Deutsche Bank to boost Europe's wind turbine manufacturing industry. *Page 2*

Energy-hungry AI turns US interest towards new nuclear
TerraPower has begun site preparation at its Wyoming site for a next-generation nuclear power plant that the company's chair, Microsoft co-founder Bill Gates, says will "revolutionise" how electricity is generated. *Page 4*

China unveils massive nuclear investment, as coal plant expansion slows
China has approved a massive $31 billion investment to build 11 new nuclear reactors across five sites, highlighting its commitment to atomic energy as a key element in its energy security and emissions reduction efforts. *Page 5*

Storage rolls out across Europe at giga pace
Romania has announced plans to have at least 2.5 GW of battery storage in operation by next year and to double capacity to 5 GW by 2026, joining a push to install storage across Europe. *Page 7*

Private sector finance: the linchpin of energy transition investment
Private sector finance is crucial to the energy transition. Joseph Jacobelli explains the ins and outs with case studies illustrating the difference it can make in bringing projects to fruition. *Page 14*

Technology Focus: Tapping into untapped wind
A novel form of wind power generation that can harness untapped wind resources through its unique design has been developed by Glasgow-based greentech innovator, Katrick Technologies. *Page 15*

World "uncertain" about need to phase out fossil fuels

Raising the alarm: former President of Ireland Mary Robinson

The failure to include text referencing a transition away from fossil fuels in a draft document ahead of an upcoming UN summit is causing concern, as world leaders gear up for COP29 later this year. **Junior Isles**

A group of former world leaders and Nobel prize winners have hit out at the removal of a specific mention of fossil fuels from the draft of a UN climate pact at the centre of a summit in New York later this month.

The 77-strong group published a letter urging governments to address the issue of fossil fuels at the summit, scheduled for September 22-23. The signatories of the letter are calling for fair timelines for reducing reliance on oil, gas and coal.

The letter was prompted by recent changes to the draft outcome document, dubbed 'the Pact for the Future'. The initial draft negotiating text for the New York Summit included a reference to "accelerating" a "transition away from fossil fuels". This was in line with the agreement already struck between almost 200 countries after negotiations at last November's UN COP28 conference in Dubai.

But revisions to the text to be put forward in the separate pact in New York have omitted any reference to fossil fuels, instead calling for climate action "on the basis of the best available science".

The letter stated: "The extraction and burning of fossil fuels is the primary cause of the climate crisis, fuelling extreme weather, fires, lethal heat, droughts and flooding that are threatening lives and livelihoods around the planet.

"Yet this isn't the end of the carnage – the extraction and burning of fossil fuels undermine all 17 Sustainable Development Goals."

The group raising the alarm includes former President of Ireland Mary Robinson – who clashed with the COP28 president in the UAE over the need to phase out fossil fuels to limit global warming – as well as Bangladesh chief adviser Muhammad Yunus, and former Swedish prime minister Stefan Löfven. Most of the signatories to the open letter came from science.

"We call on the United Nations to ensure that the Pact for the Future includes robust commitments to manage and finance a fast and fair global transition away from coal, oil and gas extraction in line with the 1.5°C limit agreed to by nations in the Paris Agreement," the letter stated.

The UN's Summit of the Future will see all the member states meet and agree a text aimed at tackling a range of global issues, including sustainable development, technological co-operation and climate change.

It will also be the last formal opportunity for climate discussions ahead of

Continued on Page 2

Europe's energy crisis is "over", says Shell boss

The energy crisis in Europe is finally over, according to the Chief Executive of Shell, as market prices and volatility return to levels before Russia's invasion of Ukraine.

"We have seen that across the energy complex this quarter, maybe more so than any of the previous ones in recent times, that we are moving back to a normalised price and margin level that is pre-2022," said Wael Sawan in an interview with the *Financial Times*, adding that gas, crude and power prices had all dropped back and become more stable.

The fall in prices and volatility in Europe saw Shell's renewable and energy solutions business, which includes power trading, post a $187 million loss, a 215 per cent drop from the quarter before. The oil major also said it had reduced its pipeline of renewable power projects under construction from 4.6 GW in the first half of last year to 3.8 GW.

Sawan said the loss was "not a massive surprise" because a lot of the unit's earnings had come from high power prices. He added that the business was in a "heavy investment phase" and that while Shell pledged to spend $10 billion to $15 billion between 2023 and 2025 on projects, it would not start to make money until the latter part of the decade.

Sawan's prediction on Europe's energy crisis came ahead of recent news that the EU reached the 90 per cent target for filling its subway natural gas storage tanks 10 weeks before the deadline set by Brussels.

According to the latest data from Gas Infrastructure Europe (GIE), corresponding to August 19th, gas reserves were at 90.02 per cent of their capacity. Spain leads the table, with its tanks at maximum (100 per cent) in the face of the cold season, when heating systems trigger consumption across the continent.

The current level of tank filling is, according to European Commission projections, sufficient to cover one third of total gas demand during the winter.

This is a huge figure, given that, even if there were to be a total shutdown of gas pipelines from Russia, the EU already has a large network of regasification stations that allow the import of liquefied natural gas (LNG) from practically any corner of the world where this fuel is extracted.

"This is the second year in a row in which we managed to reach 90 per cent full well before November 1," European Energy Commissioner Kadri Simson said in a statement. "This underlines the EU's preparedness for the coming winter, based on our intensive work over the past two and a half years."

The EU Commission, she said, "will continue to monitor the situation so that gas storage levels remain sufficiently high over the coming months and so that we also maintain our focus on improving energy efficiency and boosting the deployment of renewables".

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Continued from Page 1

the UN COP29 summit to be held in Baku in November.

The failure to refer to fossil fuels in the pact in New York would risk "sending a signal that the world is uncertain about the need to phase out fossil fuels", said Alex Rafalowicz, Director of the Fossil Fuel Non-Proliferation Treaty campaign group.

"It's extremely concerning that the text doesn't even contain the language agreed in Dubai last year," he added, referring to last November's COP28 agreement, known as the UAE Consensus.

The signatories of the letter are calling for fair timelines for reducing reliance on oil, gas, and coal, while stressing the importance of financial support to help lower-income countries transition to sustainable energy.

According to the International Energy Agency (IEA), putting the global energy system on track to net zero by 2050 this decade would require just 1 per cent of the money currently poured into the energy sector annually.

The IEA's net zero by 2050 pathway advises against any expansion of global oil and gas extraction capacity beyond projects that were approved before the end of 2021. It also recommends no new coal mines, mine expansions, or the construction of new unabated coal fired power plants.

In its latest update on coal market trends worldwide, published in late July, the IEA said global coal demand is set to remain broadly unchanged in both 2024 and 2025 as surging electricity demand in some major economies offsets the impacts of a gradual recovery in hydropower and the rapid expansion of solar and wind.

The world's use of coal rose by 2.6 per cent in 2023 to reach an all-time high, driven by strong growth in China and India, the two largest coal consumers globally, the IEA's 'Coal Mid-Year Update' finds. While coal demand grew in both the electricity and industrial sectors, the main driver was the use of coal to fill the gap created by low hydropower output and rapidly rising

Sadamori: coal demand likely to remain flat through 2025

electricity demand.

"Our analysis shows that global coal demand is likely to remain broadly flat through 2025, based on today's policy settings and market trends," said Keisuke Sadamori, IEA Director of Energy Markets and Security. "The continued rapid deployment of solar and wind, combined with the recovery of hydropower in China, is putting significant pressure on coal use. But the electricity sector is the main driver of global coal demand, and electricity consumption is growing very strongly in several major economies. Without such rapid growth in electricity demand, we would be seeing a decline in global coal use this year. And the structural trends at work mean that global coal demand is set to reach a turning point and start declining soon."

Welcome boost for wind energy manufacturers

- First tranche activated under EIB's €5 billion counter-guarantee scheme
- Wind and solar generate 30 per cent of EU's electricity in first half of 2024

Junior Isles

The European Investment Bank (EIB) has reached a €500 million counter-guarantee deal with Germany's Deutsche Bank to boost Europe's wind turbine manufacturing industry.

The announcement marks the first tranche activated under the EIB's €5 billion counter-guarantee scheme which constitutes the EIB's key contribution under the EU Wind Power Package. The counter-guarantees will improve access to finance for wind turbine manufacturers, providing them with the support they need to help boost Europe's energy security and competitiveness.

The agreement to support the supply chain forms part of a portfolio of up to €1 billion of counter-guarantees for the supply chain and investments in wind farms that Deutsche Bank will use to support the wind industry. The EIB estimates that this will trigger additional private investments of up to €8 billion.

The initiative is part of a EU Wind Power Package presented by the European Commission in October 2023 to maintain a competitive wind energy supply chain across the Union.

A quick build-up of wind power is crucial for decarbonising the economy, said EIB vice-president Nicola Beer. Together with Deutsche Bank, we are promoting the expansion of renewable energy in Europe and in that way bringing the price of sustainable energy down. The respective project will also help to safeguard and create jobs in a sustainable and competitive European industry."

The news was welcomed by European wind industry association, WindEurope, Phil Cole, Director of Industrial Affairs at WindEurope, said: "Today's announcement is warmly welcomed. It is an important step in delivering the EU Wind Power Package. There is rapidly growing demand for wind turbines that are "made in Europe". Improved access to finance and de-risking instruments are central to ensuring Europe's wind turbine manufacturers can keep up with this demand and ramp up their manufacturing output in line with the EU's 2030 targets."

Wind turbines and solar panels generated 30 per cent of the EU's electricity in the first half of the year.

According to Ember, the independent global energy think tank, wind turbines and solar panels generated 385.6 TWh of electricity in the EU during the first half of the year, surpassing the 343.5 TWh produced from fossil fuels for the first time.

The transformation of the EU's electricity system has been swift over recent years. The first half of 2024 in particular has seen almost unprecedented falls in fossil generation despite demand growing. Renewables have played a vital role in alleviating high power prices in the bloc, but sustaining the pace of this transition will not be an easy feat, said Ember. It will require dedicated policy action and implementation to ease barriers to future wind and solar deployment.

The EU's wind capacity additions are expected to ramp up only from 2025 onwards, as longer project lead times mean that the increased auction volumes and investment decisions in 2023 will take longer to deliver larger deployment. However, under current policy conditions, the EU is still forecast to fall 30 GW short of the minimum 425 GW required to meet its 2030 target, and further short of the 500 GW stipulated in the REPowerEU plan.

"As power prices return to pre-crisis levels, Europe cannot rely on the market alone to drive the necessary acceleration of renewables deployment. Well-designed and implemented incentive schemes will remain important to sustaining momentum," said Ember.

UK 'superhighway' gives boost to UK offshore wind

UK energy regulator Ofgem has approved a £3.4 billion ($4.47 billion) electricity high voltage transmission link between Scotland and England in the biggest single investment for electricity transmission infrastructure in Britain.

The 500 km Eastern Green Link 2 (EGL2) project will stretch from Aberdeenshire to North Yorkshire and will transport huge amounts of renewable energy between Scotland and England.

The joint venture between Scottish and Southern Electricity Networks and National Grid is part of a push to modernise the electricity grid to deal with greater demands placed on it by the green transition.

The new network capacity from the power line will carry enough renewable electricity to power two million homes, Ofgem said, describing it as a "superhighway".

Chief Executive Jonathan Brearley said: "Ofgem is fully committed to supporting the government to meet its aims of getting clean power by 2030. Today's announcement is a further step in putting the regulatory systems and processes in place to speed up network regulation to achieve its aim

The new interconnector cable will be able to move 2 GW of electricity between Scotland and England, partly enabling England to benefit from offshore wind energy generated by offshore wind farms in the North Sea.

Ofgem said it is pushing to fast-track the approvals process for power projects to help the UK meet its 2030 net zero carbon emissions target.

The regulator also provisionally gave the green light to a £295 million funding package for a set of upgrades to the electricity grid in Yorkshire.

The project, which is run by National Grid, will involve building new substations and overhead lines to improve networks in the North East of England.

Separately, the Electricity System Operator unveiled plans to connect up to 4.5 GW of floating offshore wind power from the Celtic Sea to south Wales' and southwest England's grids.

The recommended design connects up to 3 GW into two locations in south Wales and up to 1.5 GW into the southwest of England, with each of the three proposed offshore wind farms (also known as Project Development Areas, or PDAs) having its own connection to the onshore electricity network. The proposals are for one high voltage direct current (HVDC) connection into a potential new south Wales connection node, and two connections utilising high voltage alternating current (HVAC) technology into Carmarthenshire and North Devon.

ESO's chief engineer Julian Leslie said: "Offshore wind is vital to achieving the government's target for clean power by 2030, sustaining energy security and achieving net zero by 2050, so it is a really positive development that this is the first time an offshore wind leasing round will have been launched with a recommended high level network design in place."

In July, the new Labour government increased the budget for the next wave of schemes to a record £1.56 billion a year. About £1.1 billion of the total will be allocated for offshore wind projects, as the government tries to make up for a flopped auction round last year when no offshore wind developers bid.

The UK energy secretary has therefore raised by 50 per cent the budget for this year's subsidy contract auction, in which developers bid for 15-year state guarantees on their electricity price.

Labour wants to quadruple offshore wind capacity, double onshore wind capacity and triple solar power capacity in order to meet its target of cutting emissions from electricity generation to net zero by 2030.

The target is five years faster than the goal set out by the former Conservative government, and experts say it would require radical change to the way projects are built in the UK.

Biden-Harris Administration to invest in "crucial" grid infrastructure

The US Department of Energy (DOE) has announced $2.2 billion of grid investments across eight projects in 18 states, which are expected to add almost 13 GW of grid capacity, including 4.8 GW of offshore wind.

The projects, representing a combined public and private investment of almost $10 billion, will deploy new transmission infrastructure and technology upgrades with the aim of protecting against extreme weather, lowering costs for communities and preparing for growing demand from an increase in manufacturing and data centres.

The funds come from the Bipartisan Infrastructure Law's $10.5 billion Grid Resilience and Innovation Partnerships (GRIP) Programme; project sponsors will provide about $7.8 billion in matching funding.

The grants from the GRIP programme – funded by the bipartisan infrastructure law – mark the second funding round under the programme. In October, DOE awarded nearly $3.5 billion in grants to support 58 projects in 44 states.

The funding announced last month is from GRIP's $5 billion grid innovation programme, which focuses on projects that use new approaches to transmission, storage and distribution infrastructure to improve grid resilience and reliability.

The selected projects also include two projects for the deployment of new transmission lines – Clean Path New York, led by New York Power Authority, and North Plains Connector, led by Montana Department of Commerce. The two lines will boost grid capacity by about 4.3 GW.

"The Biden-Harris Administration is investing in the most crucial component of the nation's infrastructure, expanding and hardening the grid to allow more resilient, clean power to reach more households, and support the ongoing manufacturing boom – all while creating thousands of local jobs," commented US Secretary of Energy Jennifer Granholm.

The DOE expects to issue the second round of funding selections for GRIP's Grid Resilience Utility and Industry Grants programme and its Smart Grid Grants programme later this year.

USA looks to a different future generation mix

- Solar industry celebrates consistent growth
- Renewables an acquisition target

Janet Wood

The USA's mix of generating capacity is changing, according to new Federal Energy Regulatory Commission (FERC) data. The most recent data saw the solar industry celebrate the tenth month in a row in which solar was the largest source of new capacity. The SUN DAY solar campaign said solar was on track to become the nation's second-largest source of capacity – behind natural gas – within three years. Wind was the second most

Renewable energy sources (biomass, geothermal, hydropower, solar and wind) now represent 30 per cent of total US capacity, FERC said.

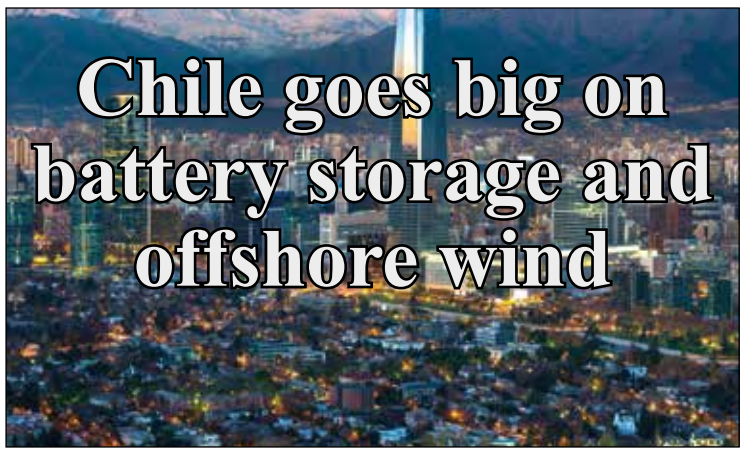
Nuclear's share of US installed capacity has dropped from 9.2 per cent to 8.0 per cent. It is now placed fifth in capacity terms, behind gas (43 per cent), coal (15.8 per cent), wind (11.8 per cent) and solar (9 per cent), albeit with total capacity rising. The slip came as the 1100MW Vogtle 4 nuclear reactor in Georgia began commercial operations, making Vogtle the largest nuclear facility in the US and the only one with four nuclear power reactors. There is no new nuclear capacity in FERC's three-year forecast, while coal, natural gas and oil are projected to contract by 20.5 GW, 3.1 GW and 16 GW, respectively. It anticipates growth in hydropower (up 1240 MW), geothermal (up 400 MW) and biomass (up 90 MW) in the period to June 2027.

"With each passing month, renewables – led by solar – expand their contribution to the nation's electrical capacity," said SUN DAY's Executive Director Ken Bossong. "Growing from just a fraction of one per cent a decade ago, solar is now nearly a tenth of US utility-scale generating capacity and poised to reach 15 per cent within three years."

Batteries have also seen an uptick, adding 4.2 GW. Battery additions were concentrated in four states: California (37 per cent of the total), Texas (24 per cent), Arizona (19 per cent) and Nevada (13 per cent).

Renewables continue to offer an attractive investment. Recently LS Power announced an agreement with Algonquin Power & Utilities Corp to acquire the latter's renewable energy business. These wind and solar assets in the USA and Canada number 44 operating assets totalling more than 3 GW of generating capacity and an 8 GW pipeline of wind, solar, battery energy storage and renewable natural gas projects that are in various stages of development.

Paul Segal, Chief Executive of LS Power, said the business complemented LS Power's existing fleet and added: "We believe this platform will play a significant role in meeting the challenges of rising electric demand and advancing the energy transition."



Chile goes big on battery storage and offshore wind

Grenergy Renovables has secured financial close for the first phase of what it claims is the world's largest battery project, in northern Chile.

Oasis de Atacama will be developed in five phases completed by 2026, when its capacity will be around 4.1 GW. Market consultant DNV provided due diligence services to Grenergy, aiding in securing $345 million from international banks.

Grenergy's Executive Chairman, David Ruiz de Andrés, said "this operation demonstrates the banks' confidence in the hybridisation of solar plants with storage."

The project aligns with Chile's goals to achieve carbon neutrality by 2050 and become a regional leader in solar technology.

Meanwhile, Chilean company SC Power has joined with UK-based renewable energy developer 17 Energy to build a floating offshore wind farm with sixty four 15 MW turbines for a total capacity of 960 MW. The proposed wind farm would be built off the coast of Chile's Biobío Region.

At a launch event for the consortium and the project, both named Viento Azul Biobío (VAB), Daniel Perdomo, Director at 17 Energy, said: "This is a pivotal moment for Chile's energy future." The wind farm, he said, may also be used for the production of green hydrogen.

The $4.3 billion project is expected to begin operation in 2032, subject to acquiring a maritime concession and receiving necessary permits.

Brazil's rush to renewables takes in floating turbines

Offshore wind developer Corio Generation and Brazilian shipyard and marine construction company Estaleiros do Brasil (EBR) have agreed to work together to study how EBR's infrastructure could be used to install offshore wind in Rio Grande do Sul state. Corio had previously announced the plan, which would see two offshore wind farms built, Casino and Rio Grande, each with a 1.2 GW capacity.

"With its long coastline and favourable sea conditions, Brazil has incredible potential to harness the power of offshore wind and build a future based on clean, green energy and a prosperous low-carbon economy," said Ricardo de Luca, Country Director of Brazil at Corio Generation.

Corio is already working with Servtec to build 6 GW of fixed offshore wind farms in Brazil.

The news came as new data from the National Electric Energy Agency (ANEEL) was published showing that the year to the end of July 2024 saw Brazil's power grid expanded by 6.5 GW, driven by the commissioning of 183 new power plants across 15 states. July alone saw 875 MW added to Brazil's energy capacity, with 10 new solar farms and 17 new wind farms. Brazil's total installed capacity reached 204 GW, of which nearly 85 per cent is renewable sources, ANEEL said.

Energy-hungry AI turns US interest towards new nuclear

- TerraPower starts site preparation for first unit
- Data centre operators considering small on-site reactors

Janet Wood

TerraPower has begun site preparation at its Wyoming site for a next-generation nuclear power plant that the company's chair, Microsoft co-founder Bill Gates, says will "revolutionise" how power is generated.

TerraPower applied to the Nuclear Regulatory Commission in March for a construction permit for a 350 MW advanced nuclear reactor, dubbed Natrium, that uses sodium, not water, for cooling and the outcome of that application is still awaited. The site is adjacent to PacifiCorp's Naughton coal fired plant, which will close in 2026.

Advanced reactors typically use a coolant other than water and operate at lower pressures and higher temperatures. The Wyoming project is the first time in about four decades that a company has tried to get an advanced reactor up and running as a commercial power plant in the USA, according to the NRC.

The TerraPower project is expected to cost up to $4 billion, half of it from the US Department of Energy. It has been delayed because Russia is the only commercial supplier of the necessary fuel and TerraPower is working with other companies to develop alternate supplies.

Interest in nuclear has been revived by power-hungry data centres and AWS, Microsoft and Google have all looked at nuclear to meet the much larger demands of artificial intelligence (AI). Earlier this year, AWS paid $650 million to purchase Talen Energy's Cumulus Data Assets, data centre on the site of Talen's 960 MW Susquehanna nuclear plant, with additional data centres planned. Microsoft, Google and Nucor, a steel manufacturer, released a request for information (RFI) about clean energy, and Baltimore-based nuclear energy company Constellation responded.

"The data economy and Constellation's nuclear energy go together like peanut butter and jelly," said Joe Dominquez, Constellation's CEO.

Many of the deals under discussion are with existing nuclear power providers but they may also use small nuclear reactors. Nucor, Oklo, Rolls-Royce SMR, Westinghouse Electric, Moltex Energy, Terrestrial Energy, General Electric, Hitachi Nuclear Energy and X-energy are among the companies with small reactors under development

Sean Graham, Research Director of cloud to edge data centre trends at IDC, said: "… generative AI is energy-intensive and requires an order of magnitude more power than general purpose computing."

US Energy Secretary Jennifer Granholm also called for more nuclear reactors to be built, saying the USA needs 98 more reactors with the capacity of Vogtle 4.

"It is now time for others to follow their lead to reach our goal of getting to net zero by 2050," Granholm said. "We have to at least triple our current nuclear capacity in this country."

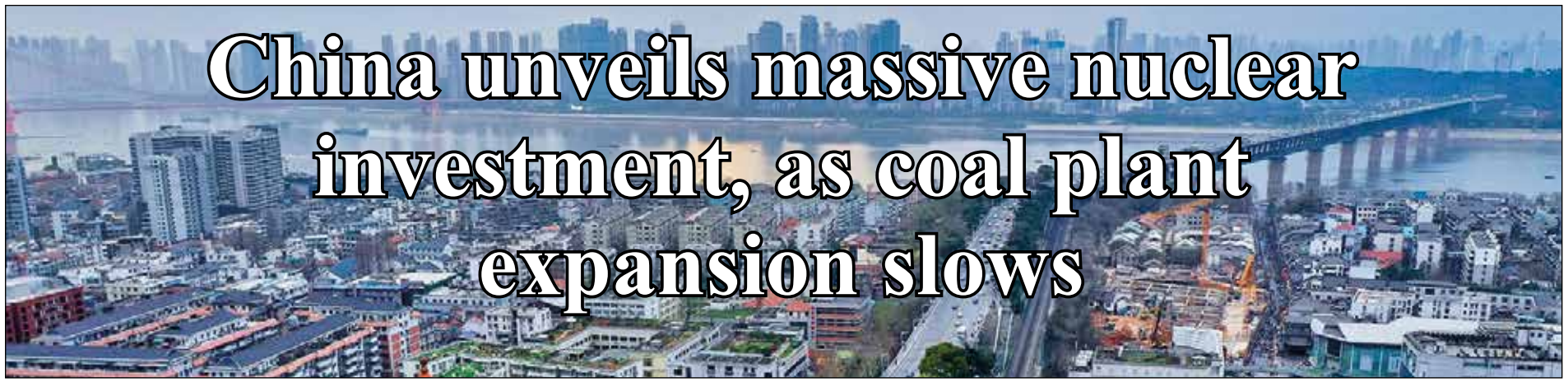
US coal plants hit by new regulations

The US Environmental Protection Agency (EPA) has finalised a new rule that will require coal fired plants and new baseload gas fired plants to control 90 per cent of their carbon emissions over the next several years through technologies such as carbon capture and efficient turbines. Other new standards will limit emissions of mercury, particulates and nitrogen oxides, and limit ash levels in waste water. States will have two years to develop plans to comply.

"The Carbon Pollution Standards provide power companies with a range of options for managing their existing generating fleets as well as investing in new generation. And they provide the time and flexibility that power companies and grid operators need to plan for and invest in compliance while continuing to support a reliable and affordable supply of electricity," said EPA spokesperson Nick Conger.

The rule change comes as AES Indiana announced investment of $1.1 billion over the next two years to convert the Petersburg site from coal to natural gas. The project could also add 250 MW of solar and 180 MWh of battery storage.

"These investments demonstrate our continued commitment to Pike County and leading the energy transition here in Indiana in a way that maintains affordability and reliability for our customers," said Ken Zagzebski, CEO of AES Indiana.



China unveils massive nuclear investment, as coal plant expansion slows

China's massive investment in nuclear demonstrates the country's determination to wean itself off coal and cut carbon emissions. **Junior Isles**

China has approved a massive $31 billion investment to build 11 new nuclear reactors across five sites, highlighting the country's commitment to atomic energy as a key element in its energy security and emissions reduction efforts.

CGN Power Co, the listed unit of state-owned China General Nuclear Power Corp, is the biggest beneficiary of the nuclear push, receiving approvals for six reactors. China National Nuclear Corp has received approval for three reactors, while State Power Investment Corp said it had received approval for two units.

The new reactors will include advanced domestic designs like the Hualong One and a fourth-generation high-temperature gas-cooled reactor.

George Borovas, Partner at Hunton Andrews Kurth, and lead at the firm's Nuclear practice, said: "China's approval of new nuclear reactors further demonstrates the country's reliance on atomic energy for energy security and its commitment to reducing emissions. The reactors will feature various designs, including the latest Chinese Gen III+ and Gen IV models. With China poised to surpass the US and France in nuclear power capacity by the end of the decade, the Chinese government's commitment to nuclear power is undeniable."

Already a world leader in wind and solar, China has turned to nuclear as a zero carbon energy source to replace the large baseload capacity predominantly provided by coal.

Coal still accounted for nearly 60 per cent of the country's electricity supply last year, according to industrial association China Electricity Council. The country's existing nuclear power capacity, from 56 reactors, accounted for about 5 per cent of total electricity demand.

According to an analysis by the Centre for Research on Energy and Clean Air (CREA) and the Global Energy Monitor.

The analysis, published last month, revealed a significant decrease in the approval of new coal fired power projects in the first half of 2024 compared to the same period last year.

A review of project documents by Greenpeace East Asia found that 14 new coal plants were approved from January to June with a total capacity of 10.3 GW, down 80 per cent from 50.4 GW in the first half of last year. In 2023 and 2022, China had approved new coal fired power projects that were set to generate more than 100 GW of power, according to the report.

Environmental group Greenpeace recently reached similar conclusions. It reported that 10.34 GW of coal fired power projects had been approved in the first half of the year, marking a 79.5 per cent decrease.

"We may now be seeing a turning point," Greenpeace East Asia project lead Gao Yuhe said.

The government has issued a slew of documents in recent months on reducing carbon emissions and accelerating the shift to renewable energy.

The National Energy Administration unveiled a three-year plan in June to retrofit existing coal power units and equip newly built ones with low-carbon technologies. Another government plan released last month to "accelerate the construction of a new power system" took aim at bottlenecks and other challenges, including how to expand transmission of renewable energy.

Gao said that China should focus its resources on better connecting wind and solar power to the grid rather than building more coal power plants.

Philippines eyes nuclear construction as part of sustainable energy portfolio

The Philippines government is targeting 2028 as the year to begin construction of nuclear power capacity to begin in 2028 with commissioning to start by 2032, according to the draft Philippine Nuclear Energy Program (PNEP) for 2024-2050.

The PNEP outlined the key targets that must be achieved for the successful commercial operations of a nuclear power plant in the country. The target minimum nuclear power capacity is 1200 MW by 2032, 2400 MW by 2035, and 4800 MW by 2050.

The key targets cited under the project development activities of Milestone 2 (2024-2028) include regulatory compliance of the country's Nuclear Power Plant (NPP) (2025-2028) and construction of the nuclear power plant (2028-2032).

"Power supply arrangements for the power produced by the NPP project will be executed in 2027 while construction will commence by 2028. After five years, commissioning and grid synchronisation of the NPP is expected," the PNEP stated.

The legal and regulatory framework for available domestic nuclear materials and reliable and responsible foreign suppliers is expected to be finalised by 2025 while the selection of processing technology, especially for waste disposal, will be completed in 2026.

Milestone 3, meanwhile, is the start of commercial operation. The commercial operation of these NPPs will contribute to at least 1200 MW capacity using conventional, SMR (small modular reactors) or MMR (micro modular reactor) technology across multiple sites in the country.

The country's transition to cleaner, more sustainable energy, received a boost last month when Aboitiz Power awarded LONGi a contract to supply solar PV modules for a 600 MW plant.

Meanwhile in July Hydrogène de France (HDF Energy), a leading player in large-scale green hydrogen infrastructure and high-power fuel cell manufacturing, signed a joint Memorandum of Understanding (MoU) with the Department of Energy and Mindanao Development Authority.

The partnership will drive research and development in efficient technologies for harnessing renewable energy sources and locally produced green hydrogen for sustainable application across targeted regions throughout the Philippines.

Raphael P.M. Lotilla, Secretary of DoE, commented: "The signing of this MoU marks a significant milestone in our journey toward a sustainable and resilient energy future. It underscores our collective commitment to harnessing the power of hydrogen technologies, which is a pivotal step in achieving our national energy goals."

Pakistan approves privatisation programme

Pakistan's federal cabinet has approved a five-year privatisation programme, which will be executed in three phases. The decision was made during a cabinet meeting held in Islamabad last month.

According to sources, in the first phase, key entities slated for privatisation include Pakistan International Airlines (PIA), the House Building Finance Corporation (HBFC), Faisalabad Electric Supply Company (FESCO), Islamabad Electric Supply Company (IESCO), and Gujranwala Electric Power Company (GEPCO).

Subsequent phases will see the privatisation of Lahore Electric Supply Company (LESCO), Multan Electric Power Company (MEPCO), Peshawar Electric Supply Company (PESCO), Hyderabad Electric Supply Company (HESCO), Sukkur Electric Power Company (SEPCO), Utility Stores Corporation, State Life Insurance Corporation, and Pakistan Re-Insurance Company.

Earlier, the cabinet had given the go-ahead for the privatisation of 13 entities under Pakistan's Power Division, including nine power distribution companies. Notably, the Quetta Electric Supply Company (QESCO) and Tribal Electric Supply Company (TESCO) were excluded from the list.

In addition to the distribution companies, power generation companies (GENCOs) were also approved for privatisation as part of the programme.

Taiwan allocates offshore wind capacity

Taiwan's Ministry of Economic Affairs has announced the results for the country's Round 3.2 offshore wind tender, awarding 2.7 GW of capacity across five projects.

The results follow the release of applicant rankings in July, which featured six developers. The ministry then said that due to the overlapping scope of some project sites, it was yet to notify each developer of the exact capacity it will be awarded.

The largest of the projects is Synera Renewable Energy's (SRE) Formosa 6 offshore wind project. The 800 MW project, with a maximum potential capacity of 1 GW, will be situated approximately 35 km off the coast of Xianxi Township, Changhua County, spanning an area of around 84 km^2. Based on the allocated capacity of 800 MW, the project can install up to 57 wind turbines, each with a capacity of 14 MW.

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Storage rolls out across Europe at giga pace

- Romania plans to reach 5 GW by 2026
- Long duration storage in sight in the UK

Janet Wood

Romania has announced plans to have at least 2.5 GW of battery storage in operation by next year and to double capacity to 5 GW by 2026.

The new goals were announced by Energy Minister Sebastian Burduja and follow recommendations by transmission system operator Transelectrica that the country needs at least 4 GW of storage. Last year Romania allocated €80 million in grants for storage and this is expected to support 1.8 GW of new capacity.

Romania is joining a push to install storage across Europe. In Germany, TotalEnergies said it has taken the final investment decision on a 100 MW/200 MWh battery in Dahlem, North Rhine-Westphalia. It is the first in a pipeline of projects arising from TotalEnergies' acquisition, in February, of German battery developer Kyon Energy which brought together the developer with TotalEnergies battery maker Saft.

"This investment decision reflects the acceleration of our integrated development in the German electricity market, the largest in Europe. For the battery system design, we will leverage synergies between our electricity teams: Saft will supply the batteries, Kyon Energy will manage development, and Quadra Energy will market this new capacity," said Stéphane Michel, SVP, Gas, Renewables & Power at TotalEnergies.

Meanwhile in Spain, Masdar plans to join with Endesa to add 0.5 GW of battery storage to 48 operational solar plants totalling 2 GW, if Masdar's acquisition plans (*see separate story*) come to fruition.

The UK has already seen a boom in battery construction – most recently developer RES was granted permission to add a 49.9 MW battery in Scotland to its 700 MW portfolio of batteries across the UK and Ireland. RES currently manages over 600 MW of battery storage systems from its control centre in Glasgow.

Now interest in the UK has moved towards longer-duration storage and with an order of magnitude increase in energy stored. SSE Renewables has partnered with a group led by Gilkes Energy to build one of the largest pumped-storage hydropower stations in the UK. The project in Scotland has a planned capacity of 1.8 GW/37GWh. The scheme includes the development of tunnels and a new power station at Loch Fearna, near SSE Renewables' existing Loch Quoich reservoir in the Great Glen hydro scheme.

Under a development services agreement with SSE Renewables, Gilkes Energy will lead the development of the Fearna project, which already has a grid connection offer. Subject to a final investment decision, the facility could become operational in the mid-2030s.

Irish markets set to miss 2030 renewable energy targets

Two energy consultancies have warned that Northern Ireland and the Republic of Ireland will miss their 2030 renewable energy target of 80 per cent energy from renewables.

Cornwall Insight said delays in planning and a shortage in grid connections will play a part in slowing down the renewables transition. They have been "significant barriers" to the Republic's Renewable Energy Support Scheme (RESS), which resulted in just three successful onshore wind projects last year. Aurora warned that the next RESS auction is unlikely to achieve its procurement target.

Steph Unsworth, Senior Associate, Aurora Energy Research, said: "Projects in Ireland remain higher cost than in other European markets due to tight supply chains on the island system and financing difficulties given the arduous planning and grid connection processes."

Kitty Nolan, Energy Modeller at Cornwall Insight, said: "While some may argue that the delay won't have a significant impact, Ireland's continued reliance on insecure imports exposes us to global market disruptions, which could drive up prices, while our dependence on fossil fuel generated power is delaying our progress toward achieving net zero. It's crucial that we streamline these planning processes and invest in grid infrastructure to meet our climate commitments."

Northern Ireland is currently designing its own renewable support scheme, but much of the procured capacity is expected to come online after 2030.

Spain attracts Abu Dhabi investor and EIB loan for solar

Masdar (the UAE's Abu Dhabi Future Energy Company) is set to join forces with Endesa in a €1.7 billion renewable energy venture in Spain. The transaction would see the two companies partner on 2.5 GW of renewable energy assets in Spain. Masdar will invest €817 million to acquire a 49.99 per cent stake in 2 GW of solar energy plants, potentially adding 500 MW of battery storage to sites, and the two companies will also explore jointly developing new projects.

Masdar has ambitious expansion plans in Europe. It recently announced an agreement to acquire 67 per cent of Greece's Terna Energy, which is targeting renewable energy operational capacity of 6 GW by 2030 and earlier this year it reached financial close, in combination with Iberdrola, on the 476 MW Baltic Eagle offshore wind project in the Baltic Sea off the coast of Germany.

The Endesa agreement cements Masdar's position in Spain, one of EU's largest solar markets. Most recently a €50 million loan from the European Investment Bank (EIB) and Matrix Renewables will support five new solar photovoltaic plants with an installed capacity of 240 MW.

"With this operation, the EIB continues to accelerate the energy transition in Spain by increasing renewable energy generation capacity," said Alessandro Izzo, EIB Director of Equity, Growth Capital and Project Finance.

Countries start to allocate funding for new nuclear plants

- Sweden assesses needed investment in new units
- Czechia, Poland, Romania move towards delivery

Janet Wood

It will cost Sweden around $38 billion to carry out its plans to construct 2.5 GW of new nuclear capacity by 2035 and ten new reactors by 2045, which will require government loans and price guarantees, according to a government-appointed commission.

The private sector has yet to invest, citing lack of a guaranteed return. In response, the government said it would look at taking on a greater share of the costs of financing and appoint a commission to study the cost-effectiveness of such projects.

The commission now says the state should offer loans that cover 75 per cent of the cost of building power plants. It should also guarantee a set price for electricity for 40 years. The commission's report said that a fleet of four or five new plants totalling 4-6 GW would be most cost-effective.

"The challenge for those who want to build new nuclear power is that the risks are seen as multiple and very large," said Mats Dillen, head of the commission.

Meanwhile in central Europe, Czech energy company CEZ has said final proposals for financing two new nuclear units at Dukovany should be completed by the end of this year. CEZ spokesman Ladislav Kriz said contracts should be exchanged with the contractor, Korea's KHNP, by the beginning of March. Construction is expected to start in 2029, with the first unit due to start producing electricity in 2036.

The Czech government continues to negotiate with KHNP over two more units at a second site, Temelin in southern Bohemia.

The Polish government has also published legislation that would allow it to provide financing for a nuclear power plant, which would be Poland's first, at the Lubiatowo-Kopalino site in Pomerania.

A government statement said: "The first of the government's legislative initiatives is aimed at providing financing for the project to build Poland's first nuclear power plant, being implemented at the Lubiatowo-Kopalino site in Pomerania". It is expected to receive around €14.05 billion ($15.57 billion) in state support in the period 2025-2030 and Poland has announced the first €1.2 billion investment from its 2025 budget.

Meanwhile, Romanian nuclear energy company Nuclearelectrica has announced plans to take forward a project to develop small modular reactors (SMRs). The project in Romania is being developed by a joint venture, RoPower Nuclear, with Nova Power&Gas. Nova is part of the private group E-INFRA group, which owns a site in Doiceşti where a 462 MW SMR may replace a coal fired thermal power plant.

Nuclearelectrica has agreed contracts related to Phase 2 of the FEED (Front-End Engineering Design) study for the project, which will be carried out by Fluor, with the US company NuScale as a subcontractor.

Hydrogen production and transmission moves forward in Germany

Shell Deutschland GmbH has taken a final investment decision on Refhyne II, a 100 MW renewable proton-exchange membrane (PEM) hydrogen electrolyser at the Shell Energy and Chemicals Park Rheinland in Germany.

Refhyne II is expected to produce up to 44 000 kg per day of renewable, also known as green, hydrogen to partially decarbonise site operations. The electrolyser is scheduled to begin operating in 2027.

"Today's announcement marks an important milestone in delivering our strategy of more value with less emissions. Investing in Refhyne II is a visible demonstration of our commitment to the hydrogen economy, which will play an important role in helping to decarbonise Shell's operations and customer products," commented Shell's Downstream, Renewables and Energy Solutions Director, Huibert Vigeveno.

Meanwhile, German utility EnBW has announced plans to invest some €1 billion to create a national hydrogen core network. The network is expected to be built by 2032 and will play a crucial role in the future European Hydrogen Backbone, according to German government plans. It will deliver hydrogen to industrial centres and power plants, and will establish routes for importing hydrogen from abroad.

EnBW subsidiaries Terranets and VNG/ONTRAS Gastransport have filed pipeline project commitments with the Federal Network Agency as part of a joint application by German transmission system operators. Terranets has also confirmed that a south German gas pipeline will connect to the hydrogen core network.

New electricity bill paves way for South Africa's major reforms

■ New electricity bill signed into law ■ Launch of nuclear project postponed

Nadia Weekes

South Africa President Cyril Ramaphosa has signed into law the Electricity Regulation Amendment Bill, setting out root-and-branch reforms of the country's electricity sector including the establishment of a competitive electricity market.

The bill amends the Electricity Regulation Act of 2006 to "open up pathways to greater competition and reduced energy costs; increase investment in new generating capacity to achieve energy security; establish an independent transmission company as the custodian of the national grid; and impose severe penalties for damage to and sabotage of infrastructure".

These changes are in line with the broader reforms guided by the Energy Action Plan, which aims to modernise and transform South Africa's electricity system to end load shedding and ensure long-term energy security.

The act spells out the duties, powers and functions of the Transmission System Operator (TSO) SOC Ltd, which must be established as an independent entity within five years. The National Transmission Company of South Africa will act as the TSO in the interim.

Under the act, an open market platform will be established to allow for the competitive, wholesale or retail buying and selling of electricity.

Market operation will be licensed as a new activity by the National Energy Regulator of South Africa (Nersa). A new Market Code will establish rules to govern the future competitive market, and the act further clarifies the principles that apply to the setting or approval of prices, charges and tariffs.

Experts have expressed concerns that private independent power producers (IPPs) may race to grab up already limited grid space. Nersa recently rejected an application for grid capacity reservation from state-owned operator Eskom, which it said was part of its efforts to "protect public procurement programmes and improve their prospects of success".

Further concern has emerged about the risk of market concentration as larger companies enter the competitive electricity market first, and about Eskom's long-term viability, given the potential impact of declining demand and rising costs.

Energy analyst Hugo Kruger noted that competition theoretically should attract investment, but it remains to be seen how the market will work in practice.

"There are a lot of 'what ifs' and hypotheticals at the moment," Kruger said. "If Eskom has to truly compete in a true market then theoretically it risks bankruptcy. It means that the IPPs can also go bankrupt."

"Access to the transmission and distribution power system must be objective, transparent and non-discriminatory," the Presidency said.

It is anticipated that diversity of supply and the promotion of renewables will stimulate demand for new skills, innovation and technology in the electricity sector, which will generate new industrial activity and in turn mitigate unemployment.

Meanwhile, South Africa has decided to postpone the launch of a 2500 MW nuclear power plant project to better address legal concerns and improve public consultation.

The project has been criticised for its lack of transparency, leading to protests from the Democratic Alliance (DA), now part of the government coalition, and several NGOs.

The Minister of Electricity and Energy, Kgosientsho Ramokgopa, announced the temporary withdrawal of the official document authorising the launch of a call for tenders, while strengthening public participation and amending the report supporting the project.

The nuclear project is seen as a strategic response to South Africa's challenge to increase production in order to avoid further blackouts, as the country's energy capacity remains under significant strain.

The postponement of the nuclear project, although seen as a temporary setback, is part of a wider strategy to restructure the energy sector.

The delay, estimated at between three and six months, will ensure that the tendering process is protected from any subsequent legal recourse, a necessity to avoid the mistakes that marked an aborted 9.6 GW agreement with Russia under President Zuma.

South Africa, as the only African nation with an operational nuclear power plant, is at a critical crossroads in its energy policy.

The 20-year life extension of the Koeberg plant confirms the importance of nuclear power in the country's energy mix, despite public reluctance and legal challenges. The government continues to regard nuclear power as an essential pillar of its strategy to guarantee a stable and diversified supply.

The postponement of the project reflects the need for the government to gain the trust of stakeholders and to enhance transparency and public participation.

Kunar River dam to add 1.5 GW to Afghanistan's power grid

The Ministry of Energy and Water (MEW) has announced plans for a new power dam on the Kunar River capable of adding 1.5 GW of capacity to Afghanistan's power grid.

Acting Minister of Energy and Water, Abdul Latif Mansoor, highlighted the completion of several major dam projects such as the Kamal Khan dam in Nimroz, Shah wa Arus dam in Kabul, Pashdan dam in Herat, and Tori dam in Zabul over the past year.

Looking ahead, the ministry plans to implement six additional large dams in Takhar, Herat, Ghazni and Baghlan provinces next year.

Over the past three years, the MEW has partnered with the private sector on numerous electricity production projects, which are expected to add 500 MW of capacity.

The ministry has also secured an agreement with the World Bank to commence practical work on the $1.16 billion Central Asia-South Asia power project, commonly known by the acronym CASA-1000, which will allow for the export of surplus hydroelectricity from Kyrgyzstan and Tajikistan to Afghanistan and Pakistan.

The CASA-1000 project will not only provide a significant boost to Afghanistan's electricity supply but also ensure the country receives $165 million annually from transit rights associated with it.

Afghanistan faces frequent power outages and unreliable supply impacting daily life and economic activities. This underscores the urgent need for expanded infrastructure and investment in energy projects to meet the growing demand and support the country's development goals.

HDF Energy plans 800 MW green hydrogen project in Tunisia

■ French company to invest €3 billion in electrolysis plant
■ Tunisia inks six MoU with European companies

Nadia Weekes

Hydrogene de France SA (HDF Energy), plans to build an 800 MW electrolysis plant to produce green hydrogen in Tunisia to serve the local market and export to Europe.

The French company has signed a memorandum of understanding (MoU) with Tunisia's Ministry of Energy for the project, which requires an initial investment of about €3 billion ($3.29 billion).

The electrolyser, powered by 1 GW of wind energy and 500 MW of solar PV, is expected to produce up to 65 000 tonnes of hydrogen per year, mainly destined for export to Europe through the SoutH2 pipeline.

The pact is one of six similar MoUs that Tunisia inked at the end of July with European companies. The ministry said the six agreements would allow Tunisia to implement the national strategy for green hydrogen and its derivatives by 2050.

"Tunisia positions itself to produce 8.3 million tonnes of green hydrogen and its derivatives by 2050, of which 2.3 million tonnes are intended for the local market and 6 million tonnes for export," the ministry added.

In June 2024, ACWA Power signed a MoU with the Tunisian government represented by the Ministry of Industry, Mines and Energy to explore the potential for a green hydrogen project. The project aims to produce up to 600 000 tonnes per year of green hydrogen in three phases, for export to Europe.

Tunisia, with untapped wind and solar resources and ample land, claims to be ideal for green hydrogen production. The country's proximity to demand centres in Europe makes it a desirable destination for large hydrogen projects set up by global investors.

Iraq celebrates new transmission line from Turkey

Iraqi Prime Minister Mohammed Shia al-Sudani has welcomed a new power line bringing electricity from Turkey to its northern provinces as a "strategic" step to link Iraq with its neighbouring countries.

The 115 km high voltage line connects to the Kisik power station west of Mosul and will provide 300 MW from Turkey to Iraq's northern provinces of Nineveh, Salah al-Din and Kirkuk.

Decades of war have badly affected Iraq's infrastructure, with power cuts frequent in the blistering summer. Many households have just a few hours of mains electricity per day.

Despite its vast oil reserves, Iraq remains dependent on imports to meet its energy needs, especially from neighbouring Iran, which regularly cuts supplies.

Sudani has repeatedly stressed the need for Iraq to diversify energy sources to ease the chronic power outages, including imports from Gulf countries.

The Iraqi government aims "to complete the connection with the Gulf Cooperation Council (GCC) electric grid by the end of this year", Sudani said.

"This will enable Iraq to integrate into the regional energy system," allowing it to diversify its energy sources, he added.

In March, a 340 km power line started operating to bring electricity from Jordan to Al-Rutbah in Iraq's southwest.

Network investments drive utility growth

- E.On increases investments in energy transition to €2.9 billion in H1 2024
- Iberdrola to acquire 88 per cent of Electricity North West

Junior Isles

Investment in electricity networks is driving growth in some of Europe's largest utility companies.

Last month, German energy giant E.On said investments in the energy transition increased to €2.9 billion in the first half of 2024, about €500 million more than in the prior-year period. Most of these investments – over €2.1 billion – went toward E.On's Energy Networks business

In the first half of 2024, E.On performed in line with its Group full-year targets. As planned, the company also further increased its investments year-on-year, made progress in digitalising, and systematically helped customers to decarbonise.

E.On CEO Leonhard Birnbaum said: "Having performed as planned in the first half of 2024, we're well on track to achieve our Group targets for the full year. As Europe's largest distribution system operator, serving 47 million customers and providing smart energy solutions, we want to be the company that makes new energy work in Europe."

E.On CFO Nadia Jakobi commented: "E.On again delivered a good operating performance in the first half of the year, with adjusted Group EBITDA of €4.9 billion, which is fully on target. This positive development is based on the successful execution of our investments, which we increased by more than 20 per cent year-over-year to €2.9 billion, with a focus on the regulated network business. We will continue to systematically drive this growth based on our investment programme. We therefore fully confirm our Group guidance."

Energy Networks' first-half adjusted EBITDA totalled around €3.3 billion (H1 2023: €3.4 billion). Temporary effects, particularly for re-dispatch costs in Germany, had a significant positive impact on this business division's prior-year earnings. Over time, E.On passes these effects on to its customers through grid fees. In addition, milder temperatures in the first half of 2024 resulted in lower energy transmission volumes. Higher costs from the upstream network also had a temporary negative impact on earnings. By contrast, earnings were boosted in particular by higher investments in E.On's growing network infrastructure. In the first half of 2024 alone, E.On added around a quarter of a million new connections to its networks across Europe.

Meanwhile at the start of August, Iberdrola signed an agreement to acquire 88 per cent of Electricity North West (ENW) in the UK for an equity value of £2.1 billion (€2.5 billion). The deal values 100 per cent of the company, including debt, at approximately €5 billion.

The acquisition is consistent with Iberdrola's strategy to invest in electricity networks and in countries with a strong credit rating, such as the United Kingdom (AA credit rating). Since the merger with ScottishPower in 2007, the UK has been one of the leading investment destinations for the company, where it has invested around £30 billion (€36 billion) in that time. ScottishPower is the only 100 per cent green integrated utility in the UK.

Ignacio Galán, Iberdrola's Executive Chairman, said: "This transaction reinforces our commitment to investing significantly in electricity networks, which are a critical component for supporting the electrification and decarbonisation of the economy.

"The agreement is also consistent with our strategy to invest in countries that have ambitious investment plans and stable and predictable regulations. As a result of this acquisition, our regulated networks asset base in the UK is now valued at €14 billion. When combined with the US, these two markets now represent two-thirds of our total global regulated asset base."

European utilities struggle despite returns on renewables

Lower gas and electricity prices have impacted revenues at German energy company RWE. As the energy crisis eases, the Frankfurt-listed energy company reported revenues for the first half of €11.2 billion, down from €14.9 billion during the same period in 2023.

RWE, however, reported a 20 per cent increase in earnings in renewables, in particular driven by better weather conditions and commissioning of new capacity. Forty five per cent of electricity generated in the first half of 2024 came from renewable sources, reducing CO_2 emissions by 27 per cent.

Markus Krebber, CEO of RWE AG, said: "Our 'Growing Green' strategy is paying off – more than half of our adjusted EBITDA is already coming from our wind and solar energy business. Our power production from renewables reached a record level of 26 terawatt hours and accounted for 45 per cent of total generation. At the same time, we have significantly reduced our CO_2 emissions. We are continuing to invest billions of euros in the value-creating expansion of our geographically and technologically broadly diversified portfolio. At the same time, the demand for green electricity continues to rise. RWE is ideally positioned to continue to drive the energy transition both in Germany and internationally."

In the first half of 2024, the company invested €4.5 billion net in new plants and made the final investment decision for the construction of further wind, battery and solar projects with a total capacity of 2.9 GW. These include the offshore wind projects Nordseecluster in Germany and OranjeWind in the Netherlands. A total of 10.2 GW of new capacity is currently under construction.

It was a similar story for Danish energy group Ørsted A/S. It reported a net loss of DKK1.7 billion ($251 million/€228 million) for the second quarter of 2024 as it booked DKK3.9 billion in impairment losses mainly related to a decision to stop the FlagshipONE e-fuel project in Sweden and a delay at the Revolution Wind offshore wind project in the US.

"The liquid e-fuel market in Europe is developing slower than expected, and we have taken the strategic decision to de-prioritise our efforts within the market and cease the development of FlagshipONE," said Chief Executive Mads Nipper.

"We will continue our focus and development efforts within renewable hydrogen, which is essential for decarbonising key industries in Europe and closer to our core business," Nipper added.

The company otherwise said its operations are performing well, with increased earnings from its offshore wind farms.

Vestas reports further losses, but order intake up

Danish wind turbine manufacturer, Vestas Wind Systems A/S reported further losses in the second quarter of 2024 amid weak revenues, although orders climbed from the previous year. Loss for the second quarter was €156 million ($172 million), compared to the previous year's loss of €115 million.

In the second quarter, Vestas generated revenue of €3.3 billion, a decrease of 3.9 per cent from €3.43 billion in the previous year.

However, an order intake of 3.6 GW – worth €4.4 billion – rose 54 per cent from 2.33 GW (€2.5 billion) a year ago.

The company's offshore wind turbine order backlog on June 30th stood at 4489 MW, amounting to €5.5 billion – €3.1 billion more than in the same period last year.

The total wind turbine order backlog stood at a little over 27 GW and €28.1 billion at the end of the second quarter, up from around 20 GW and €20 billion on June 30, 2023. According to the wind turbine manufacturer, this "reflects significant offshore order intake in Poland and Germany as well as a high level of onshore order intake in the USA".

According to Vestas's financial report, the average selling price of a wind turbine in Q2 2024 was €1.21 million/MW, up from the average of €1.04 million/MW in Q2 2023.

Vestas said revenue is expected to reach €16.5 billion – €17.5 billion in 2024 against the previous guidance of €16 billion – €18 billion, including service revenue. The company expects to achieve an EBIT margin of 4-5 per cent against the previous guidance of 4-6 per cent and is planning investments of approximately €1.2 billion in 2024.

- The Nordex Group has reported robust financial and operational performance for the first half of 2024, with sales increasing by around 25 per cent to €3.4 billion (H1/2023: €2.8 billion). Total performance, including changes in inventories, rose by 16 per cent to €3.3 billion (H1/2023: €2.8 billion).

MHI achieves strong y-o-y increases in Q1 FY2024

Mitsubishi Heavy Industries (MHI) Ltd. has announced that order intake rose 15.0 per cent year-on-year (y-o-y) to ¥1847.5 billion $12.68 billion) in the quarter ended June 30, 2024. Revenue rose 13.0 per cent to ¥1111.5 billion y-o-y, resulting in profit from business activities (business profit) of ¥83.5 billion, a 60.7 per cent increase over the previous financial year, which represented a profit margin of 7.5 per cent.

In energy, order intake increased by ¥417.6 billion y-o-y, driven by gas turbine combined cycle (GTCC) order bookings in the Americas. A total of six large frame gas turbine units were booked globally. Margin improvements in all major businesses served to increase segment business profit by ¥23.5 billion y-o-y.

The results came as MHI subsidiary Mitsubishi Power signed a Memorandum of Understanding (MoU) with Hygenco Green Energies to explore the possibility of delivering green hydrogen/ammonia-fired GTCC power plants. This MoU aims to provide these integrated solutions in India and internationally.

Mitsubishi Power is developing hydrogen and ammonia firing technologies in order to decarbonise existing gas turbine-based plants by converting their fuel from natural gas to hydrogen/ammonia. The company has already been involved in multiple projects worldwide.

Americas

Vestas wins 136 MW US repowering deal

Vestas Wind Systems has been selected to supply wind turbines for a 136 MW repowering project in the USA. Under the contract, Vestas will supply, deliver, and commission 62 of its V120-2.2 MW turbines. It will also be providing operational support services under a multi-year agreement.

Turbine delivery is set to start in Q3 2025 and the site is expected to be operational in Q4 2025.

The names of the customer and the project were not disclosed.

Solar power capacity to triple in Alaska

Renewable IPP has signed an agreement with Homer Electric Association of Alaska to enable construction of a 45 MW solar farm, which will triple solar energy output in Alaska.

The new solar farm will be built near Puppy Dog Lake in Nikiski on the Kenai Peninsula. It will consist of over 60 000 solar panels across 300 acres, and could start operating in late 2027.

Approval for the project will be sought from the Regulatory Commission of Alaska. Keriann Baker, Chief Strategy Officer for Homer Electric Association said that the project will double the renewable power produced by the utility, taking it to 24 per cent of its overall generation.

Xcel Energy seeks new generation proposals

Xcel Energy is seeking proposals for new power generation systems in Texas and New Mexico, USA, as it retires its older power plants in the coming years and as demand in the region grows.

Forecasts show that the region needs an additional capacity of 5 GW by the end of the decade. Xcel Energy said that it will evaluate submissions with proposed commercial operation dates within or before May 2027 to May 2030. Decisions regarding individual projects are expected by summer 2026. The company has launched an all-source request for proposals. Xcel is focusing on reliability and affordability as key requisites.

Asia-Pacific

AtkinsRéalis wins Qinshan life extension mandate

Candu Energy, an AtkinsRéalis company, has won a contract with Third Qinshan Nuclear Power Company Limited (TQNPC) to support the ongoing 30-year life extension of the two CANDU reactors at the Qinshan Nuclear Generating Station, located in China. AtkinsRéalis will provide design, engineering, and procurement services.

The reactors are approaching their scheduled date for component replacement, which will facilitate a further 30 years of operation. This contract follows mandates in 2021 and 2022 for pre-project preparatory work, both of which were completed on schedule.

ABB to upgrade Singapore GT control system

The 1300 MW Keppel Merlimau Cogen (KMC) CCGTon Jurong Island in Singapore will be upgraded by ABB to improve efficiency and reliability. The scope includes replacing the existing Egatrol 8 turbine control system with Egatrol X.

The project involves upgrading DCS components while keeping the overall structure as far as possible. Instead of having to rebuild the entire system in one go, ABB will provide a flexible, customised approach whereby older components are replaced as and when needed. This prevents unnecessary downtime, avoids the costs associated with loss of operation, and ensures a stable, reliable energy supply with high availability.

Mitsubishi wins 500 MW CCGT order in Sarawak

Mitsubishi Power has received an order for an M701F gas turbine and a steam turbine for the 500 MW combined cycle gas turbine (CCGT) power plant in Sarawak, Malaysia. The equipment supply contract was signed between Mitsubishi Power and Sinohydro Corporation Limited, the EPC (engineering, procurement and construction) contractor for this project.

Mitsubishi Power will also provide auxiliary equipment and dispatch technical advisors essential to support the installation and commissioning of the equipment. The gas turbine will be designed to co-fire fuel containing up to 30 per cent hydrogen.

Located in Miri, a city in northeastern Sarawak, the project is owned and operated by Petros Power, a subsidiary of Petros, the Sarawak-owned oil and gas company.

Mitsubishi Power has also secured a Long-Term Service Agreement with Petros to ensure the stable operational performance of the power plant following its commercial operation.

Europe

Germany awards 5.5 GW offshore wind tender

Germany's Federal Network Agency has announced winners for a tender for three sites with a total of 5.5 GW of offshore wind capacity in the North Sea.

RWE won two sites – areas N-9.1 and N-9.2 – with a combined capacity of 4.0 GW, each site having a capacity of 2.0 GW. The two wind parks should be operational by 2030 and 2031, respectively.

Waterekke Energy won the right to build a 1.5 GW offshore wind. Luxcara will act as asset manager for the project. The project is scheduled to be connected to the national grid in 2029.

The site N-9.3 is located in the Exclusive Economic Zone (EEZ) in the German North Sea approximately 85 km northwest of the German island of Helgoland.

All three sites have undergone a preliminary investigation by the Federal Maritime and Hydrographic Agency (BSH).

Alight to deploy 2 GW solar in Sweden

Alight has been chosen by Swedish state-run forest owner Sveaskog to deploy 2 GW of new solar capacity across Sweden over the next five years.

Alight will develop, build and co-own the solar parks that will be installed on Sveaskog's land. Sveaskog, which owns 14 per cent of Sweden's forests, will co-invest between 30-49 per cent in the solar facilities and contribute with sustainable management initiatives during the development process.

The first two projects are already under development. They will be located in central and southern Sweden, spanning areas of 150 ha and 70 ha, respectively.

Two French orders for Nordex

Nordex has received two orders from France for a total of 57 MW. The orders include long-term maintenance agreements for 20 years after commissioning, scheduled for autumn 2025.

Nordex will install four N149/5.X wind turbines on 105 m tubular steel towers in a 22.8 MW wind farm in Centre-Val-de-Loire.

It will also install six N163/5.X turbines on 118 m tubular steel towers in a 34.4 MW wind farm in Hauts de France.

European Energy to build Polish solar farms

Two new solar farms will be constructed in Poland after an agreement between European Energy and mBank. The two solar farms are located in Pomerania and West Pomerania and will have a total capacity of 70 MW. Łobez PV Farm will have a capacity of 16 MW, and Dębnica Kaszubska will have a capacity of 54.2 MW. The solar farms have entered the construction phase and are expected to be completed in Q4 2024.

The total amount of financing that mBank will provide for the two solar farms is €33.3 million. The production of renewable energy from the two solar farms will be 67 GWh annually.

Siemens Energy wins large-scale H_2 contract

German utility EWE has awarded Siemens Energy a contract to supply a 280 MW electrolysis system, to be built in the city of Emden, Germany. It is scheduled to go into operation in 2027 and provide up to 26 000 tons of green hydrogen annually. In addition to supplying the electrolyser, EWE and Siemens Energy have agreed a ten-year service contract.

The electrolyser from Siemens Energy is based on PEM technology, which uses electricity to split water into hydrogen and oxygen along the proton exchange membrane. This technology is particularly suitable for operation with renewable energies due to the very flexible ramp-up times.

The electrolysis plant is part of EWE's large-scale hydrogen project "Clean Hydrogen Coastline", which consists of four sub-projects. The German government and the European Commission had classified the project as a strategic funding measure.

International

Nordex wins 102 MW order in Türkiye

Nordex has received five orders from Akfen Renewable Energy for a total of 102 MW of wind turbines in Türkiye. From autumn 2025, Nordex will supply and install 19 turbines from its Delta4000 series for the extension of five existing wind farms. The order also includes ten-year service contracts for the turbines, with the option of Akfen extending the service contracts for an additional five years.

The extension of the Hasanoba and Kocalar wind farms in northwestern Türkiye will each comprise five N149/5.X turbines. Akfen has also ordered a total of nine N133/4800 turbines for the wind farms Denizli in western Türkiye, Sarıtepe in the south, and Üçpınar in the northwest of the country.

EWEC invites bids for Taweelah CCGT plant

Emirates Water and Electricity Company (EWEC) has issued a request for proposals (RFP) for the Taweelah C IPP project, a new carbon-capture-ready combined cycle gas turbine plant located in the Al Taweelah Power and Desalination Complex, 50 km to the northeast of Abu Dhabi.

EWEC said the 2.5 GW plant is scheduled to begin commercial operation in Q3 2028. It said that Taweelah C will primarily provide transitional capacity to support the integration of large-scale renewable energy and provide additional flexibility during periods of peak power demand.

Developers will enter into a long-term agreement with EWEC as the sole procurer.

Ethiopia signs PPA for 300 MW wind project

AMEA Power has signed a PPA with Ethiopian Electric Power to advance development of the 300 MW Aysha 1 wind power project in Ethiopia.

AMEA also signed an Implementation Agreement with the Ethiopian Finance Ministry and a land lease agreement with the Somali Region State Government.

The $620 million project in Ethiopia's Somali Region State will be the largest wind farm in the Horn of Africa, capable of generating some 1.4 TWh annually.

AMEA Power's wholly-owned subsidiary, AMEA Power Aysha Wind One, will oversee the project's development, construction, ownership, and operation.

Wärtsilä signs decarbonisation agreement

Wärtsilä has renewed its existing O&M agreement with QIT Madagascar Minerals (QMM), part of the Rio Tinto group, and the agreement has been expanded to include a Decarbonisation Agreement.

This agreement allows for optimising all the assets in the microgrid, including renewable energy usage, with the effect of both reducing emissions and also producing notable cost savings. The continued O&M agreement covers QMM's 24 MW engine power plant located at the company's ilmenite mineral sands mine at Fort Dauphin in southeastern Madagascar.

The key elements of the agreement include optimised dispatch of the plant's six Wärtsilä 32 engines and QMM's battery energy storage and renewable assets with Wärtsilä's GEMS Digital Energy Platform. The GEMS software uses machine learning technology to optimise multiple energy generation assets and ensure maximum utilisation of renewable energy.

Siemens Energy and CSCEC to restore Baiji

Iraq has chosen a team of China State Construction Engineering Corporation (CSCEC) and Siemens Energy to rehabilitate the 1 GW unit two of the Baiji gas power station. The 1.6 GW power station in Salahuddin province was a major supplier of electricity in Iraq before it was put out of action in 2014.

CSCEC will act as the main contractor, and will also finance the work. Siemens will supply the main equipment such as the turbines, transformers and control centres, and CSCEC will provide auxiliary elements, such as fire protection, pipes and civil works. The work is expected to break ground in 2025 and be completed in 2026.

Hydrogen

Africa looks to potential as green hydrogen producing continent

Namibia is gearing up to host the first Global African Hydrogen Summit in early September. Organisers are keen to have all elements of African society included in hydrogen projects that could energise Africa and make it an important producer of renewable energy and hydrogen in the energy transition. Meanwhile, another conference will take place in South Africa in October.

Gary Lakes

As the energy transition gets underway in most parts of the world, African leaders are keen to have the entire continent of Africa get involved in green hydrogen production. Africa's abundant renewable energy resources of wind, solar and hydro power gives it prime potential to be a major global producer of green hydrogen, which is viewed as a sustainable solution for the continent's growing energy demand in the midst of addressing climate change. Some organisations believe that Africa has the potential to produce as much as 5000 megatons of hydrogen annually. That is as much as the current total world energy supply.

As it looks now, Africa has the greatest potential to produce solar electricity, as much as 40 per cent of the world's total. This is due to the fact that production of solar energy in Africa would be stable and would not vary due to weather conditions. The continent is also believed to have the wind potential to produce electricity that could meet its demand by over 250 times. It also has a capacity to produce the largest amount of hydroelectricity. Currently more than 90 per cent of this capacity is untapped.

These reasons make Africa a prime candidate for green hydrogen production. The conferences in Namibia and the Hydrogen Africa conference in South Africa in October both seek to accelerate the hydrogen economy throughout the continent. The conferences look to not only establish a degree of energy autonomy for African countries, but also address the issues of reaching net zero and pushing economic growth. There are also efforts being made to encourage the active participation in renewables and green hydrogen within segments of society that are usually marginalized.

Hydrogen promoters are looking for government assistance and foreign investment to move the sector forward.

Experts on the subject agree that the continent's green hydrogen economy will require substantial investment. Estimates range from $450 billion to $900 billion by 2050. But according to the European Investment Bank, Africa could produce 50 million tons per year by 2035 at a cost competitive with global oil prices, according to a recent report in the UAE's *Zawya*. According to the report, those investment figures would require an injection of $6 billion until 2030 to meet net zero goals, and of that, $200 million would go annually to infrastructure alone.

But, with green hydrogen currently costing between €2.50/kg and €5.50/kg to produce, it remains higher than fossil fuels.

"Only through partnerships and collaboration will the hydrogen ecosystem in Africa be able to take off," Tiago Marques, head of content at the Namibia summit and Vice President of Production at the Sustainable Energy Council, was quoted by *Zawya* as saying. He added that African countries are working to attract as much funding as possible.

However, Africa is already seeing the development of a number of green hydrogen projects that are using renewable energy as power sources, among them:

- Egypt's Green Hydrogen Plant – This is a pioneering project aimed at leveraging the country's abundant renewable energy resources, particularly solar and wind, to produce green hydrogen. This plant is part of Egypt's broader strategy to become a leader in the green hydrogen sector and to contribute to global efforts in reducing carbon emissions. A number of international organisations have become involved in the project, which is designed to produce enough hydrogen to meet Egypt's needs and export to neighbouring countries.
- South Africa's Hydrogen Valley – This initiative focuses on creating a hydrogen corridor that will support various industries, including mining, manufacturing, and transportation. The Hydrogen Valley stretches from Mokopane in Limpopo, where platinum group metals (PGMs) are mined, through Johannesburg, and ends in Durban. The project aims to establish, accelerate, and embed hydrogen innovations, leveraging South Africa's rich renewable energy resources and expertise in the Fischer-Tropsch process. It is expected to create significant economic opportunities, including job creation and the development of new industries. South Africa is looking to secure 4 per cent of the global green hydrogen market share by 2050.
- Namibia's SCDI (Southern Corridor Development Initiative) Green Hydrogen Project – Located in the Tsau Khaeb National Park, this project is a groundbreaking initiative for Namibia requiring an investment of $10 billion. It is a gigawatt-scale green hydrogen plant that will be capable of producing 300 000 tons of green hydrogen annually by 2030. It is being developed in collaboration with Hyphen Hydrogen Energy, a German consortium. First production is targeted at 125 000 tons in 2026. The project is expected to offset CO_2 emissions by 5-6 million tons annually.
- Mauritania's Project Nour – The project is located in northern Mauritania covering two onshore areas totalling 5000 km^2 with the aim of developing up to 10 GW of electrolysis capacity, which would make it one of the largest green hydrogen facilities in the world. The first phase is to have a renewable generation capacity of 3 GW that will power up to 1.6 GW of electrolysis to produce 150 000 tons annually. The project is a 50/50 partnership between Chariot Green Hydrogen and TE H2, a company co-owned by TotalEnergies and EREN Group.

Kenya, Morocco, Ethiopia, Djibouti, Angola and Nigeria are other African countries working to get green hydrogen projects rolling, as are the North African states of Algeria, Tunisia and Libya.

Gas

Ukraine seizes vital Russian gas transit point in Sudzha

The war in Ukraine has taken a surprising turn with the invasion by Ukrainian forces into Russian territory and the capture of the town of Sudzha and the gas metering station there.

Gary Lakes

A bold move taken by Ukraine's military has led to the capture of an important gas metering station inside Russia as well as the town of Sudzha and more than 1000 km^2 of surrounding countryside. Launching a military operation in early August, Ukrainian forces had by mid-August seized control of a large chunk of the Kursk Oblast and were fighting to secure a small portion of Russia lying north of the border with Ukraine with the stated intention of establishing a 'buffer zone' within Russia.

Within that area is a key transit point for Russian natural gas through which gas continues to flow to European countries despite a variety of sanctions imposed by the European Union. The gas is produced in western Siberia and is routed through Sudzha and through the Ukrainian gas network to a crossing point on the Slovakia border. From there the gas is transported to Austria, Slovakia and Hungary.

A pre-war agreement between Russia and Ukraine allows for the transit of gas through this route. However, that agreement is due to expire by the end of the year and it is not expected to be extended due to the war. Ukrainian Energy Minister, German Galushchenko, has said Kiev does not intend to extend or replace the transit agreement.

Before Russia decided to invade Ukraine in February 2022, the EU was Gazprom's single largest market, representing 40 per cent of the group's gas demand. Since then, Russian shipments to Europe have fallen significantly with only the gas through Ukraine arriving by pipeline. Russia continues to export gas to Europe in the form of LNG, but that may not continue for much longer as US LNG exports and those from other suppliers fill Europe's energy gap.

Gazprom operated four pipelines to Europe, Nord Stream though the Baltic Sea to Germany, but it was destroyed through an act of underwater sabotage, a pipeline system through Belarus and Poland, but that stopped when Europeans objected to Russia's invasion of Ukraine and Moscow demanded that the gas be paid for in rubles. There exists the TurkStream gas pipeline across the Black Sea to Turkey, and the pipeline through Ukraine.

While the lack of gas sales to Europe has had an impact on Russia's economy, Moscow has also found clever ways to continue exporting gas and oil, most to Asian customers.

The situation is not a good one for Ukraine either. The pipeline systems through Ukraine and Eastern Europe were constructed during the time of the Soviet Union. In post-Soviet Europe many Eastern countries continued to depend on Russian gas, but following stoppages in Russian gas flow in 2006 and 2009, and their integration into the EU, Eastern EU members opted to seek a new supply of gas. Since the fall of the Soviet Union, Ukraine relied on Russian gas, but it was often in dispute with Gazprom over supplies that unaccounted for or payments that were not made. Those circumstances created a series of disagreements between the two countries and control of the gas network through Ukraine might be considered one of the reasons why Moscow wishes to control the country.

Russian gas flowing through Ukraine generated substantial transit fees for Kiev and became an important part of the Ukrainian budget. The country also depended heavily on Russian gas supplies that also gave Kiev a strategic advantage as a go-between from Europe and Russia, as its role always needed to be taken into consideration when gas agreements were made.

Furthermore, Ukraine was able to secure investment in the pipelines and other infrastructure that contributed to economic growth.

The post-war situation may contribute to a new dynamic. If Ukraine and Russia reach an amicable end to the fighting it could mean that Gazprom might continue to ship gas through Ukraine. It could mean that EU countries other than Austria, Slovakia and Hungary may renew their purchases of Russian gas. If not, it means that Ukraine will likely continue with its current programme to establish new sources and routes for gas supply as well as further develop its own gas resources, energy infrastructure and gas storage facilities. Ukraine is already drawing gas supplies from pipeline connections with neighbouring European states, a step that would likely be strongly encouraged by the EU as it considers Ukraine's eventual membership in the organisation. And if Ukraine is admitted as a member of NATO, it will surely seek gas supplies that are not Russian.

The energy storage revolution goes global

The G7 nations' ambitious energy storage target demonstrates global action is needed to meet the renewable goals established at COP28. As renewable energy capacity surges, the demand for scalable long-duration energy storage to provide reliability and flexibility has never been more critical. Irbisio Cleantech Infrastructure Fund's **Sergey Buchin** explains.

In April, G7 nations set a new global energy storage target of 1500 GW by 2030, a six-fold increase in electricity storage.

This marks a new wave of international climate action, with leaders recognising that we not only need aspirational carbon targets, but concrete technology goals to achieve decarbonisation. If met, this target will result in energy storage deployed at scale to transform the availability of renewable resources and strengthen energy security.

The necessity for increased storage has become clear following the rapid deployment of renewable energy globally. At COP28 almost 200 countries agreed to "transition away" from fossil fuels, and triple renewable energy capacity to 11 TW by 2030. This significant stride was welcomed but raised major questions about energy supplies at times when the wind is not blowing, and the sun is not shining. The issue was summarised recently by the International Energy Agency (IEA), which concluded that the "rapid expansion" of batteries would be critical to meeting the energy goals set at COP28.

Long-duration energy storage (LDES) specifically will form the linchpin of the energy transition by providing adequate capacity to ensure 24/7 availability of clean energy. To achieve a net zero energy system while managing fluctuations in demand and supply, electricity grids around the world will need to deploy 8 TW of LDES by 2040. Fortunately, there are commercially available LDES technologies which can meet this need. The challenge now is to scale these clean energy technologies and reduce barriers to their deployment . The UK's House of Lords Science and Technology Committee released a report in March, 'Long-duration energy storage: get on with it', highlighting that the government must "act fast" to ensure LDES technologies can scale up and contribute to the decarbonisation of the electricity system.

Once these obstacles are overcome, the energy industry is positioned to reach the bold net zero and storage goals established on the global stage.

These deployments are not happening in a vacuum. Demand for clean electricity is surging as large commercial customers that require growing amounts of energy, such as data centres operators, have made public commitments to cut their net emissions to zero. For example, tech giants like Amazon, Microsoft and Meta have emerged as the dominant force in corporate green power procurement, as they seek to match the skyrocketing electricity demands of their Artificial Intelligence (AI)-driven data centres with their looming sustainability targets.

These forward-looking companies are also demanding 24/7 clean power purchase agreements (PPAs) where zero carbon energy supply is matched with demand on an hourly basis. While this may be challenging for wind or solar to meet alone given their inherently intermittent nature, when LDES is deployed alongside clean energy generation, it becomes possible to flexibly meet the needs of energy users without relying on reserve fossil fuel generation to fill the gap when the wind doesn't blow, or the sun doesn't shine.

Similarly, as renewables are rolled out on a larger scale, LDES can combat imbalances in supply and demand and changes in transmission flow patterns across the entire grid to replace fossil fuels and ensure system stability. For example, in Australia, the Queensland government's Stanwell Power Station will be replaced with a multi-phase clean energy development including renewable generation and LDES. The project aims to bring a large battery installation online later this decade.

This project demonstrates how sites once occupied by coal fired power stations can be ideal locations for renewable generation and energy storage. By 2030, around half of European coal power plants are expected to be retired with most European countries planning to fully phase out coal before 2040. Fortunately, these legacy coal fired plants leave behind assets which are good candidates for conversion to clean energy hubs and can be adapted by developers. The large tracts of land and existing grid connections can rapidly connect renewable capacity without the need for new transmission infrastructure. In addition, these regions are frequently already home to a strong energy-focused workforce that can be readily retrained on new technologies.

Buchin: long duration energy storage technologies are now available, which provide up to 12 hours of storage and offer advantages over existing battery systems

Once clean energy hubs are deployed, new LDES technologies can store and discharge larger quantities of energy over longer periods than earlier battery types, making it possible to store clean energy when available to use when needed. This means that the lights still come on, and EVs still charge, even when the sun is not shining, and the wind is not blowing.

Today, short duration storage, primarily using lithium-ion (Li-ion) technology, is already being deployed, but current solutions cannot meet the demands of an increasingly renewables grid alone. These installations are mostly able to discharge for 2-4 hours, which provides adequate capacity to mitigate demand peaks and provide short-term grid stabilisation but falls short of enabling intermittent energy resources to truly power the grid. Recent questions around sustainability of critical minerals used in Li-ion batteries, such cobalt and nickel have also caused concerns.

Fortunately, new long duration technologies are now available which provide up to 12 hours of energy storage and offer advantages over existing battery systems.

The technology is commercially available; now, the focus must shift to ramping up manufacturing, deploying new solutions at scale, and advancing clean energy projects. This approach is essential for meeting increasing demand while reducing costs. However, many planned renewable energy projects are being hampered by persistent problems accessing the electricity grid, for example, limited capacity and outdated planning regulations. In the UK, the Environmental Audit Committee found that the current queue to access the grid has over twice the amount of generation required to meet the government's target of decarbonising the energy system by 2035.

A recent poll conducted by Opinium Research and commissioned by Renewable UK reveals strong public support for new renewable energy projects and grid infrastructure. The survey of 10 021 UK adults found that 59 per cent of respondents support the construction of new electricity grid infrastructure to facilitate the rollout of renewable energy, with only 6 per cent opposing.

Today's grid was designed for large, centralised generating stations and relatively predictable residential and light commercial energy loads. However, as the energy mix shifts to decentralised renewable generation and EV charging increases, outdated grid infrastructure will need to adapt and overcome impediments if net zero targets are to be achieved.

The G7 nations' ambitious energy storage target demonstrates global action is needed to meet renewable goals established at COP28. As renewable energy capacity surges, the demand for scalable LDES to provide reliability and flexibility has never been more critical. Fortunately, the battery industry is ready to respond to ambitious global goals through increased manufacturing capacity and the rapid advancements in sustainable, flexible, and cost-effective LDES technology.

To meet these bold targets and ensure a resilient energy future, it's essential to overcome grid interconnect obstacles, scale up clean energy projects quickly and effectively and deploy innovative storage solutions. Once this has been achieved, the full potential of renewables can be unlocked to secure a sustainable future for all.

Sergey Buchin is Founder and CEO of Irbisio Cleantech Infrastructure Fund.

LDES is needed when the wind doesn't blow

CCUS: a route to advancing hydrogen production

Carbon capture utilisation and storage (CCUS) can be a viable interim solution to advancing hydrogen production. World Hydrogen Leaders' **Nadim Chaudhry** looks at the opportunities for CCUS-enabled low carbon hydrogen and how US policy is accelerating the advancement of this vital fuel of the future.

While its relevance in helping to reach climate goals has long been recognised, deployment of carbon capture, utilisation and storage (CCUS) has been slow and consistently accounting for less than 0.5 per cent of global investment in clean energy technologies.

Although CCUS is not a new technology and there are currently around 41 operational facilities globally, it has typically been deployed at a small scale – mainly for R&D projects and for enhanced oil recovery. In order for CCUS to meaningfully contribute to climate change goals, the amount of CO_2 captured would need to grow four-fold from current levels by 2030, according to the International Energy Agency (IEA) report: 'Accelerating deployment – CCUS in Clean Energy Transitions – Analysis'. However, stronger climate targets and investment incentives are now starting to drive increased momentum into CCUS – and one of the key strategies to provide a boost to the technology is the efficient production of hydrogen.

Hydrogen is a versatile energy carrier that can help support the decarbonisation of a range of hard-to-abate sectors where electrification from renewable sources cannot deliver the level of energy output required. These include iron, steel, chemicals and cement production – as well as hydrogen-based fuels for aviation, shipping and long distance haulage.

CCUS can facilitate the production of low carbon hydrogen (sometimes referred to as 'blue' hydrogen) from natural gas and provide an opportunity to bring it into new markets in the near term – and at reasonable cost.

It can help alleviate pressure on already constrained electricity grids, allowing renewable electricity generation and electrolytic hydrogen production to scale at a more manageable pace. This benefit of CCUS-enabled hydrogen over the next decade has been recognised in the Committee on Climate Change's recently published Climate Change Committee's 2023 Progress Report to Parliament.

Today, the cost of CCUS-enabled hydrogen production is likely to be around 50 per cent of hydrogen production via electrolysis powered by renewables-based electricity. While the cost of electrolytic hydrogen is anticipated to reduce over time with the onset of increasingly cheaper electrolysers and renewable electricity, CCUS-equipped hydrogen will most likely remain a competitive option across regions typically associated with low-cost fossil fuels.

Recently there has been a significant increase in the appetite to develop CCUS projects, with a 50 per cent increase in CO_2 capture in the 12 months between 2022 to 2023, according to the CCUS Institute's 'Global Status of CCUS Report 2023'. This has been driven by governments internationally coming under increasing pressure to meet global climate targets, implementing robust legislation and providing clear pricing signals in order to make CCUS commercially viable.

Despite this positive news, there remain three significant issues. From the many announced CCUS projects, only around 5 per cent have taken firm investment decisions due to the uncertainty of demand, a lack of clarity around certification and regulation – and critically important – the lack of infrastructure available to actually deliver the hydrogen to customer sites. And, according to the IEA, to help deliver a much-decarbonised heavy industry by 2030, a third of all hydrogen production will need to be dedicated to those hard to abate sectors – and currently these applications only account for around 0.1 per cent today. So, there is considerably more work to do.

The fact that CCUS is far from a mature industry, a single stakeholder is typically unable to take on all the expertise, risk and capital expenditure needed across the whole value chain. As such, the most significant challenges with deploying CCUS at scale are the multiple different, distinct stakeholders that need to be coordinated including: the industrial plants which are the CO_2 emitters themselves; the various CCUS technology suppliers which separate and capture the CO_2; providers of processing, compression solutions transportation solutions – and, finally, experienced storage providers who can inject and store the CO_2 underground.

It is evident that urgent policy action is needed to create demand for low carbon hydrogen and unlocking the necessary investment to accelerate the scale-up of production and building of delivery infrastructure.

Currently, different policy approaches are being undertaken by governments to encourage the deployment of CCUS at scale. In particular, the US has provided a much-needed shot in the arm for the infrastructure required to scale up technologies. Incentives under the Inflation Reduction Act (IRA) provide project developers with a $50 per metric tonne of CO_2 tax reduction where CO_2 is stored in dedicated storage sites. And the Infrastructure Investment and Jobs Act passed in November 2021 provided a combined $15 billion to support CCUS and low-carbon hydrogen production.

The IRA has had a considerable positive impact on hydrogen, enabling the US to have the largest hydrogen project pipeline of any country. It currently accounts for 18 per cent of total announced capacity, allocating Australia to second place at 14 per cent. And while the percentage of hydrogen projects in the EU surpass both of those (at 29 per cent), it should be remembered that this figure accounts for the whole of the EU (consisting of 27 countries) and the UK – which ultimately results in relatively minor pipelines per country.

While Europe may be advancing the highest number of projects overall, the US is considerably closer to offering early scale-up, with the generous IRA tax credits, eventually helping a strong flow of US projects towards final investment decision (FID).

The majority of announced projects are for green hydrogen, which is produced using renewable energy and electrolysis and is the cleanest form of hydrogen production. However, it is also expensive, making access to cheaper clean power necessary to achieve the desired economics.

While most of the recently announced projects are for carbon-free hydrogen, the projects that are most advanced are dominated by blue hydrogen, especially in the US. Blue hydrogen is mainly produced from natural gas and creates carbon dioxide as a by-product, so it's a low carbon solution, but not strictly a 'clean' one. However, it enjoys a significant cost advantage over green hydrogen, particularly where natural gas is cheap, as in the US and Canada.

Today, the cost of CCUS-enabled hydrogen production remains around half that of producing hydrogen through electrolysis powered by renewables-based electricity. And while the cost of electrolytic hydrogen will decline over time, with cheaper electrolysers and renewable electricity, CCUS-equipped hydrogen will most likely remain a competitive option in regions with low-cost fossil fuels and CO_2 storage resources.

In discussions with Greg Bean, Director, Gutierrez Energy Management Institute at the University of Houston, he commented: "Recent federal government policies affecting low carbon intensity (LCI) hydrogen – specifically the funding of seven hydrogen hubs, along with IRA production tax credits for LCI hydrogen and enhanced CCUS tax credits – should accelerate the initial wave of CCS hydrogen given its current cost advantage over electrolytic hydrogen, especially in the US with low natural gas prices. However, the more favourable tax treatment for electrolytic hydrogen in the IRA and the likely reduction in electrolytic hydrogen cost suggests that it might ultimately have a larger market share in an aggressive decarbonisation scenario."

Hydrogen trading is still at a relatively nascent stage but could see significant growth this decade. Even low carbon hydrogen will be crucial for net importers to reach net zero targets – and for net exporters like the US to maximise benefits from clean energy deployment. CCUS-based hydrogen is likely to become an internationally traded commodity to help countries meet their hydrogen demand in a more economical way.

However, Bean goes on to note: "With main export markets likely to be in Europe and North Asia, there could be policy actions in these countries that penalise or limit CCS hydrogen imports. A relevant example is the "maximum methane intensity values" and associate penalty structure being discussed for LNG imports into Europe. Time will tell.

We are in a decisive decade and need to scale solutions today if we wish to avoid the worst of climate impacts on our society and global ecosystem. Both CCUS and low-carbon hydrogen are well-tested and the US has shown that they can be rapidly scalable solutions that can deliver decarbonised industries at a lower cost.

The significant opportunities for low carbon hydrogen can only be delivered through coordinated international collaboration. This requires cross-industry partnerships that must work together based on guiding principles of lower costs, speed, and uncompromising quality.

Nadim Chaudhry is CEO of World Hydrogen Leaders. World Hydrogen Leaders will be hosting World Hydrogen Week, the world's largest hydrogen event in Copenhagen, Denmark, from September 30th to October 4th, 2024.

Private sector finance: the linchpin of energy transition investment

Private sector finance is crucial to the energy transition. **Joseph Jacobelli** explains the ins and outs with case studies illustrating the difference it can make in bringing projects to fruition.

Those involved in the energy transition, directly or indirectly, acknowledge three crucial challenges when investing in new projects or solutions: the upfront capital requirement is substantial, the funding scale is immense, and the private sector is instrumental in this process.

But what exactly constitutes private sector finance? What are the primary markets? Who are the major players? Are these stakeholders and governments committing sufficient capital? Empirical data indicates that, although we are falling short of our targets and further funds are needed, the overall trend is encouraging.

A challenge for energy transition projects and solutions is the requirement of most of the capital upfront. As such, investors have sizeable financing burdens. A utility-scale solar power generation facility, say one of 100 MW, could be completed within just a few months, but all of the capital expenditure will have gone in before it starts generating any revenues. In China, which constructs some of the cheapest solar farms on earth thanks to massive economies of scale, the investment would amount to approximately Yuan340 million ($47.7 million), and roughly double that amount in the US and Europe; note costs will vary substantially depending on land costs and other factors.

A developer would thus have to put a significant amount of equity, $25 – $50 million, assuming a 50 per cent bank financing ratio. Other clean energy projects such as onshore wind, or hydropower face a similar situation. Even clean energy digital solutions would require a significant amount of upfront capital, for research and development, and then proof of concept, for example.

But how much capital will be needed? Projections for the capital requirements are staggering. Several trillion dollars will be required annually. The Energy Transitions Commission estimated in 2023 an average annual investment of $3.5 trillion (see chart for details). The IEA put the annual number in 2021 at $4.5 trillion. The International Renewable Energy Agency (IRENA) estimated in 2023 that $5 trillion would be needed annually. Accountancy firm Deloitte, also in 2023, put the range at an annual $5-7 trillion. The estimates differ as the different entities factor in slightly different bases in categories of energy transition projects.

Broadly speaking, the bulk of the money would go towards the power sector, including zero-carbon power generation, energy storage, grid networks, including smart grids and grid flexibility. Other targeted areas are buildings (retrofits, renewable heating, heat pumps), transport (road charging infrastructure, aviation, shipping), carbon removal (natural climate solutions, hybrid and engineered carbon removal solutions), clean hydrogen (production, transport, storage), as well as hard-to-abate industries such as aluminium, cement, chemicals, and steel.

Private sector finance in the energy transition refers to the direct or indirect investment of funds by private entities into initiatives that aim to mitigate climate change, reduce greenhouse gas emissions, or promote sustainable development. Apart from corporations, there are at least 15 types of such financial entities. Family offices, insurance companies, pension funds, sovereign wealth funds, and endowments, foundations, and philanthropies have capital that they can invest directly or indirectly – they might purchase shares in a company and be active or passive participants in the operations. Angel investors, crowdfunding platforms, venture capital firms, and private equity firms are typically solely direct investors. Brokerages, hedge funds, institutional fund management, investment banks, mutual funds, and wealth management firms are indirect investors. Among direct investors, the biggest pool of capital is corporations as well as insurance companies, pension funds, private equity, and sovereign wealth funds. Investment risk mitigation is primordial for all these entities. They often invest with one or more other parties and also prefer projects involving well-proven technologies.

Three short case studies illustrate the energy transition investment approaches by some of these central private sector entities.

Singapore government company Temasek and global asset manager BlackRock set up Decarbonization Partners. It is a tie-up investment vehicle focused on decarbonisation technologies. Decarbonization Partners said in April 2024 that its inaugural fund raised $1.4 billion, although its fundraising target was just $1 billion.

Investors in this fund include more than 30 institutional investors from 18 countries, including corporates, family offices, insurance companies, public and private pension funds, and sovereign wealth funds. These include entities such as US insurer Allstate Corp, Spanish financial services group Banco Bilbao Vizcaya Argentaria, Japan's Mitsubishi UFJ Financial Group, Danish private investment company (majority owner of the LEGO Group) Kirkbi and energy company TotalEnergies.

It had invested in seven companies across various decarbonisation technologies, with a majority of the capital going towards clean energy and advanced mobility solutions, as of April 2024. About 50 per cent of the capital was allocated to companies based in the US, with the rest split between Europe and the Asia-Pacific.

Sweden's H2 Green Steel attracted a myriad of investors. The company aims to produce steel using green hydrogen instead of coal, drastically cutting carbon emissions in the steelmaking process. It secured €1.5 billion ($1.7 billion) in funding from investors to build a plant as of September 2023. They include Singaporean sovereign wealth fund GIC, private equity firms Altor and Hy24, and US investment firm Just Climate. This funding round, the largest private placement in Europe in 2023, brings H2 Green Steel's total equity raised to over €1.8 billion ($2 billion) since its launch in 2021.

In January 2024, it announced that it had secured €4.75 billion ($5.3 billion) in new funding for its planned flagship plant in Boden, Sweden, which will be the world's first large-scale green steel project.

The funding includes €4.2 billion ($4.7 billion) in debt financing, nearly €300 million ($335.8 million) in equity from investors, and a €250 million ($279.8 million) grant from the EU Innovation Fund. New shareholders include the Microsoft Climate Innovation Fund and Siemens Financial Service. Importantly, half of the initial yearly steel volumes have already been sold through binding customer agreements.

The final case study is an initiative by the UK's independent advisor to the government, the Green Finance Institute. The institute estimates that the UK requires £1 trillion ($1.3 trillion) in infrastructure investment to achieve net zero by 2050, an amount that can only be reached with private sector involvement. One potential source of funding is UK insurance and pension funds, which have an estimated £3 trillion ($4 trillion) in assets. The institute has designed sectoral solutions, including Green Transition Funds (GTFs), to facilitate this.

GTFs use private capital to fund infrastructure projects, with initial government guarantees backing loan repayments. As these programmes mature, public support will no longer be needed. The application of this model to EV charging infrastructure demonstrates significant potential savings and benefits. Assuming a construction cost of around £20 billion ($26.4 billion) to deploy a national charging network, the GTF could save the government about £13 billion ($17.7 billion) in irrecoverable costs. While this is still an initiative, it illustrates another potential avenue for the utilisation of private capital.

The private sector plays a central role in the energy transition. It can provide the massive upfront capital required. While the IEA and other bodies report that global funding for decarbonisation is falling short of targets, the three examples illustrate that the overall trend is encouraging. They also show that despite rising costs of capital, significant investor appetite for decarbonisation investments remains.

Joseph Jacobelli heads family office Bougie Impact Capital. He has over 30 years' experience in energy markets as an investor, executive, and analyst. He promotes climate finance awareness through publications and on the "Asia Climate Finance Podcast." This commentary is based on a section of his forthcoming book "Empowering Clean Energy's Succession: how policy and finance are changing business for the climate".

(US$, billion)	Subsector	Average Capital Investment Needed Per Year 2021-2050	Total Sector Investment Needed Per Year 2021-2050
Power Sector	Zero-Carbon Power Generation	1,300	**2,400**
	Power Networks	900	
	Power Storage & Grid Flexibility	200	
Buildings	Retrofits	230	**500**
	Heat Pumps	130	
	Renewable Heating	140	
Transport	Road Charging Infrastructure	130	**240**
	Aviation	70	
	Shipping	40	
Carbon Removal	Natural Climate Solutions (NCS)	100	**130**
	Hybrid & engineered carbon removal solutions	30	
Clean Hydrogen	Production	40	**80**
	Transport & storage	40	
Industry	Chemicals	40	**70**
	Steel	10	
	Cement	10	
	Aluminum	10	

Avenues of investment needed to reach net zero by 2050. *Source: Oğuz S, 'Breaking down the $110 Trillion Cost of the Clean Energy Transition' (Decarbonization Channel 11 October 2023) https://decarbonization.visualcapitalist.coml*

Tapping into untapped wind

Wind Panel can capture low-level and ground effect winds

A novel form of wind power generation that can harness untapped wind resources through its unique design has been developed by Glasgow-based greentech innovator, Katrick Technologies. 'Wind Panel', which will be suitable for use in a wide range of environments including urban and industrial, addresses some of the limitations of current wind power. **Vijay Madlani** explores the development of the technology and how it will change the game.

Wind power is one of the biggest and fastest growing forms of renewable energy. In 2022, electricity generation from wind increased by a record 14 per cent, or 265 TWh, to produce 2100 TWh in total. Though this is a significant achievement, according to the International Energy Agency (IEA), the Net Zero Scenario calls for a total of 7400 TWh of wind power by 2030. This will require an average growth of 17 per cent annually, presenting a huge challenge for planning and installation of large-scale projects.

One potential solution to this problem is to further diversify the energy mix through development and implementation of new renewable technologies that address the limitations of existing technologies. The IEA has stated that technology innovation will be essential in tackling climate change and achieving energy policy objectives. This is one of the drivers behind Katrick Technologies' mission to accelerate the world's transition to renewables through innovation.

Founded at the University of Strathclyde by Karthik Velayutham, the company grew from the initial concept of vibrational technology as a way to produce carbon-free power. Katrick Technologies is now a leading innovator in greentech, focused on developing novel decarbonisation technologies.

The compay's lead product is the Wind Panel – a market-first wind power generation system with a multitude of potential users and applications. Traditional turbines in use today are mostly three-bladed horizontal-axis wind turbines (HAWT), consisting of a rotor shaft, an electrical generator and a gearbox.

The design and height of conventional wind turbines mean that they must be installed in remote areas with large amounts of space. Rotary motions operate most effectively 10 m or more above ground level, where wind has a more consistent flow and laminar characteristics.

The prototype was tested in wind tunnels to replicate potential operational conditions

Many wind turbines have a cut-in speed of 3-5 m/s. This means that they are generally effective at capturing wind and generating energy, as 90 per cent of the world experiences winds of 4 m/s or less throughout the year. However, their mechanism and size mean that they cannot capture low-level, ground or gust winds. These winds are less consistent and are characterised by instantaneous changes in speed and direction. These types of winds are, at present, unexploited, and require different types of technology to capture.

Katrick Technologies recognised this significant untapped potential and developed the Wind Panel in response. The hexagonal panel consists of several channelling ducts, each containing aerofoils. The aerofoils are not connected like the blades of a traditional turbine, but instead operate independently. When wind flows through the ducts, the aerofoils oscillate mechanically. These oscillations are then converted directly into clean energy.

The large surface area, the independent aerofoils and the design of the ducts allows the panel to capture pockets of energy. The ducts were designed in collaboration with the Manufacturing Technology Centre (MTC) and use the ducting effect for wind speed augmentation. This means that they can focus higher wind speeds onto the aerofoils. The design also enables the system to react to instantaneous changes in wind speed and direction, thus allowing it to capture energy from untapped low level and gust winds.

Katrick Technologies is an intellectual property (IP)-based company and is currently developing its concept into a fully-realised technology that will be licensed to original equipment manufacturers (OEMs) for wider scale production and commercialisation. The Wind Panel is currently at the prototyping and testing stage. The initial prototype was developed as part of Katrick Technologies' partnership with the MTC, and this has since been subjected to several rounds of rigorous testing to determine key parameters and outputs.

The Wind Panel has been validated to Technology Readiness Level (TRL) 5 by the University of Strathclyde, and Stage 1 of the Alpha testing phase was completed at the end of 2023. This phase involved testing the prototype in wind tunnels to replicate potential operational conditions. The first set of tests took place at the Silverstone Sports Engineering Hub, and the second at the University of Strathclyde.

During the testing phase, the Wind Panel exceeded predefined performance targets and exceeded efficiency forecasts. At Silverstone, a wind speed acceleration of 1.5 times was recorded, demonstrating that the design of the prototype was effectively increasing wind speeds and therefore increasing potential energy production through the ducting effect.

Wind Panel has already surpassed all its predefined performance targets during testing

Upon completion of Alpha Stage 1, Katrick Technologies have since advanced to Stage 2 to carry out further tests under simulated environmental conditions. It is hoped that at this stage the technology will be validated to TRL6. Stage 3 of testing will then involve optimisation and final upgrades to the technology informed by the findings of the preceding phases.

Katrick Technologies has also been carrying out a long-term wind mapping project at a range of sites, including Edinburgh Airport. At this location, Katrick Technologies has installed specialist sensors to determine wind levels and characteristics identifying which areas would be most suitable for wind capture.

The Wind Panel is intended for use in a range of industries and settings and Katrick Technologies plans to release the equipment in several sizes for different markets.

Its first iteration will be a Wind Panel intended for use at industrial and logistics sites such as airports, ports, and big box retail sites to provide onsite power generation. Katrick Technologies will also release a larger version of the panel designed to be used as a complementary technology within existing wind farms, to fill the space at ground level and capture untapped winds. Finally, it will release a smaller version of the Wind Panel that can be used in residential areas and fitted to homes and other structures.

Due to the comparatively small size and modular configuration of the panel, it will be ideal for installing on buildings and in more built-up areas where space is limited. It will also offer a customisable solution, as users will be able to install as many or as few panels as needed to meet their individual energy requirements. As the Wind Panel can capture low-level and ground effect winds, it does not need large amounts of open space or specific heights to function effectively.

The data collected from the testing process so far suggests that the potential power generation and cost savings could be significant. It is estimated that a 1 kW panel will be able to generate up to 2200 kWh of energy annually, while also offering an impressive carbon saving of over half a tonne of CO_2 per year.

This also translates to cost savings, with a current projected levelised cost of electricity (LCOE) of 18p/kWh (¢23.6/kWh). This provides a behind-the-meter solution to deliver electricity cheaper than current grid pricing.

As an IP-based company, Katrick Technologies is now engaging with OEMs to find a suitable partner to manufacture and commercialise the Wind Panel. It will continue to carry out testing and to further develop the prototype to a full working panel. Wind Panel has already surpassed all its predefined performance targets during testing and looks set to continue producing exceptional results. Its latest phase of development will bring it even closer to market, and with the vast potential of this technology in harnessing untapped resources and offering a truly flexible and scalable power generation solution, it is set to revolutionise wind power.

Vijay Madlani is CEO at Katrick Technologies.

Junior Isles

Easing the gridlock

We have heard it many times: "there's no transition without transmission", yet Europe and the US have the longest deployment times for transmission and distribution lines. Some recent announcements both in the UK and across the pond, however, indicate that governments are attempting to pull out all the stops in an effort to tackle what is perhaps the biggest obstacle to greening the global economy.

It has been nearly a year since the International Energy Agency (IEA) published its report, 'Electricity Grids and Secure Energy Transitions', offering a first-of-its-kind stocktake of grids worldwide. The report revealed that grids are not keeping pace with the rapid growth of key clean energy technologies such as solar, wind, electric cars and heat pumps and warned that without greater attention to policy and investment, "shortfalls in the reach and quality of grid infrastructure" could put the goal of limiting global warming to 1.5°C out of reach and undermine energy security.

According to the IEA at least 3000 GW of renewable power projects, of which 1500 GW are in advanced stages, are waiting in grid connection queues – equivalent to five times the amount of solar PV and wind capacity added in 2022. This shows grids are becoming a bottleneck for transitions to net zero emissions. The number of projects awaiting connection worldwide is likely to be even higher, as data on such queues is only available for countries accounting for half of global wind and solar PV capacity.

New grid infrastructure often takes five to 15 years to plan, permit and complete, compared with one to five years for new renewables projects and less than two years for new EV charging infrastructure.

In Europe, the US, Chile and Japan, the biggest barriers relate to public acceptance of new projects and the need for regulatory reform. In Europe in particular, permitting procedures cause significant delays. The IEA highlights that the US and EU have the longest deployment times for distribution – around three years – and transmission lines – between four and 12 years.

Further, while investment in renewables has been increasing rapidly – nearly doubling since 2010 – global investment in grids has barely changed, remaining static at around $300 billion per year.

Just a few months ago, Eurelectric, the association representing Europe's electricity sector, published its 'Grids for Speed' report outlining what needs to happen in electricity grid development to facilitate the transition to a more distributed electricity system increasingly based on wind and solar.

It said €67 billion investment annually is needed to 2050, up from €36 billion per year in 2023, to deliver a distribution grid that will enable the energy transition.

The good news is governments are taking note. Recent months have seen a flurry of activity in the transmission sector, as Europe and the US attempt to address the crucial grid issue.

Certainly the new British Labour government is going full steam ahead. Last month UK energy regulator Ofgem gave the green light to what is the biggest single investment for electricity transmission infrastructure in Britain. A £3.4 billion electricity "superhighway" is to be built between Scotland and England as part of a push to modernise the electricity grid to deal with greater demands placed on it by the green transition. Ofgem said it is pushing to fast-track the approvals process for power projects to help the UK meet its 2030 net zero carbon emissions target.

The massive new 500 km interconnector cable, known as Eastern Green Link, will be able to move 2 GW of electricity between Scotland and England. This will partly enable England to benefit from offshore wind energy generated by offshore wind farms in the North Sea. Construction is planned to start later this year, with the new connection due to be operational by 2029.

Separately, the Electricity System Operator (ESO) unveiled plans to connect up to 4.5 GW of floating offshore wind power from the Celtic Sea to south Wales' and southwest England's grids.

The plan is part of the ESO's own push to upgrade the UK's renewable energy capacity, and could provide enough power for more than four million homes.

The proposals are an enabler of The Crown Estate's Celtic Sea Floating Offshore Wind Leasing Round 5, a nationally significant 4.5 GW of floating offshore wind power that will connect directly into the transmission network – one of the largest floating wind initiatives in the world.

In the US meanwhile, the Biden-Harris administration announced last month that it will invest $2.2 billion in eight projects across 18 states. The projects are aimed at adding nearly 13 GW of transmission capacity. Like the UK, the new projects will carry power from 4.8 GW of upcoming offshore wind.

Unlike the UK, however, they are more geared towards safeguarding supply across the country. The projects, representing a combined public and private investment of almost $10 billion, will deploy new transmission infrastructure and technology upgrades with the aim of protecting against extreme weather, lowering costs for communities and preparing for growing demand from an increase in manufacturing and data centres.

The funds come from the Bipartisan Infrastructure Law's $10.5 billion Grid Resilience and Innovation Partnerships (GRIP) Programme.

Commenting on the investment, US Secretary of Energy Jennifer Granholm, said: "The Biden-Harris Administration is investing in the most crucial component of the nation's infrastructure, expanding and hardening the grid to allow more resilient, clean power to reach more households, and support the ongoing manufacturing boom – all while creating thousands of local jobs."

In addition to plans for building about 600 miles of new transmission and 400 miles of re-conductored wiring, the projects also include grid-enhancing technologies, long-duration energy storage, solar energy and microgrids.

The fact that the government is supporting these technologies makes sense. According to S&P Global, solar arrays, wind farms and battery storage combined to deliver more than three-quarters of all US utility-scale capacity additions over the last four years and is on track to account for nearly 90 per cent of new resources in 2024.

S&P Global, however, warned that some technologies face greater risk if Trump secures a second term, as he is promising policy shifts on electric vehicles and offshore wind, among other environmentally-friendly energy technologies.

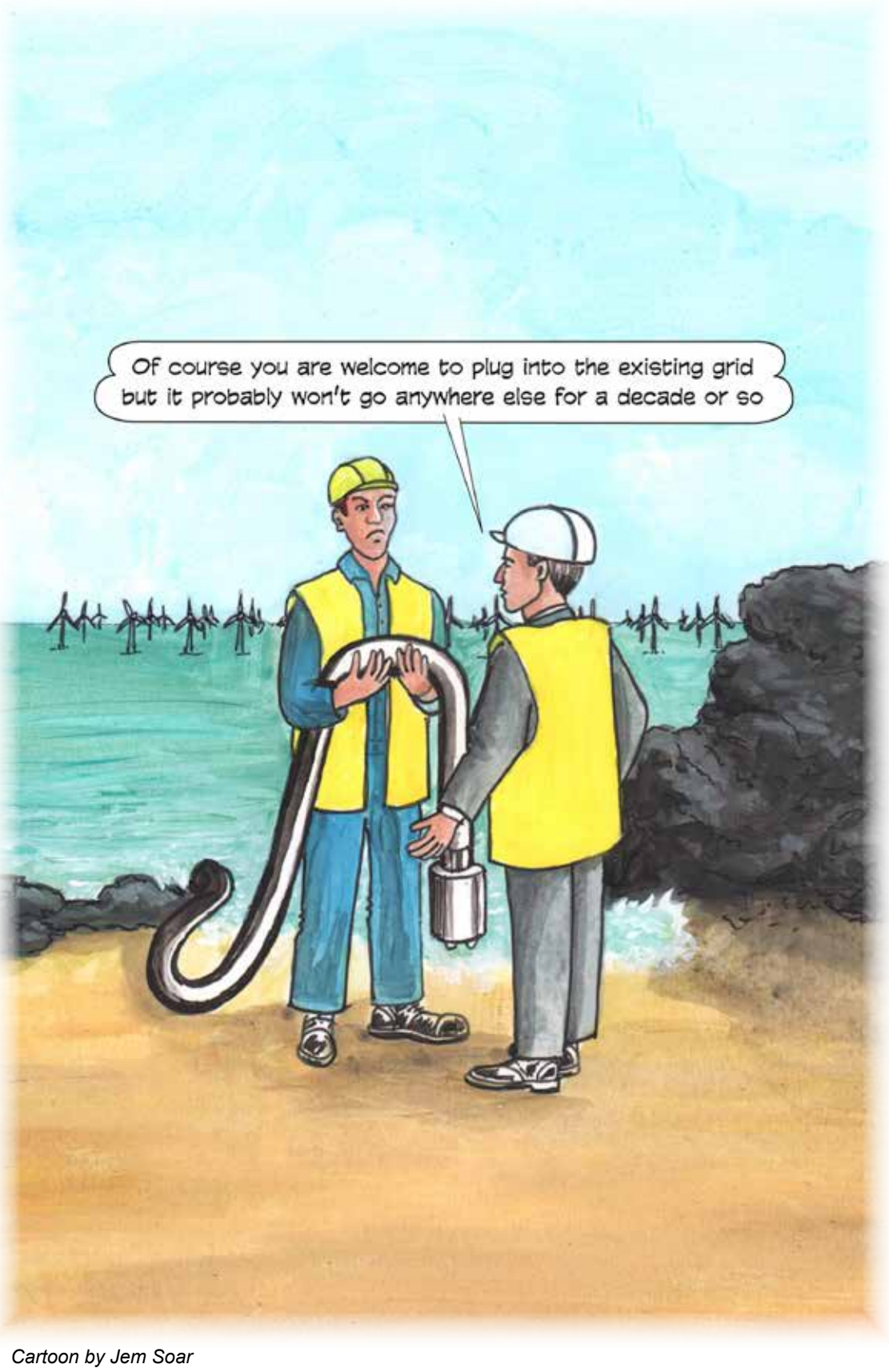
Timothy Fox, Managing Director at research firm ClearView Energy Partners, recently told S&P Global in an interview that in the event of a second Trump administration, new offshore wind projects will likely not advance through the permitting process.

How these projects fare if Donald Trump regains the Whitehouse is anyone's guess. Although the GRIP has bipartisan support, Trump's stance on renewables is clear from his previous time in office. If the drive for offshore wind disappears, which is entirely possible, then so too might some of these transmission and energy storage projects.

Speaking in an editorial written before Kamala Harris replaced President Joe Biden as the Democrat candidate in the November election, Anna Mosby, Head of global climate policy at S&P Global Commodity Insights, said: "The 2024 election is obviously going to be a pivotal moment for climate- and energy-related policy in the United States. "We've got two candidates that are coming at the issue from very different perspectives…"

Clearly it is make or break time. As Niklas Persson, Managing Director of Hitachi Energy's Business Unit Grid Integration put it: "We are at a defining moment in the energy transition. With unprecedented levels of renewable power being added globally, we must reconsider how we design, plan, and operate power systems to support the rapid pace of the energy transition."

While Europe is certain to accelerate its efforts in improving electricity grid infrastructure, the US can only hope that a Trump presidency does not result in gridlock.



Cartoon by Jem Soar