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Energy Transition Investment Series

Britain needs to raise its objectives if it wants to comply with its climate commitments. This should bode well for the number of clean energy investment opportunities. This first in a series of country analyses looks at the country's generation and consumption profiles, policy, emissions targets and ability to attract the investment needed to meet its targets. *Page 14*

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EU aims to bridge emissions gap with 2040 target

Eurelectric's Kristian Ruby called for measures to advance electrification

The European Commission's communication for a 2040 target for carbon emissions has been broadly welcomed. While the pace of delivery of this ambition is key, there are concerns over how that ambition will be achieved. **Junior Isles**

The European Commission has recommended a 90 per cent reduction in the EU's net greenhouse gas emissions by 2040 (in comparison to 1990 levels) in a move to bridge the gap between the 2030 climate targets and 2050.

Member states are now called on to agree on both the ambition level, set to be finalised by June, along with the required enabling conditions to deliver this target. The proposal will be considered by EU member states and the European Parliament before being formally adopted and will form the basis of the EU's update to its Nationally Determined Contribution (NDC) at COP30 in 2025.

Commenting on the target, Alistair Phillips-Davies, CEO of UK energy company SSE, said: "The focus now should be on the speedy delivery of this ambition, particularly unlocking

the potential of offshore wind in the North Seas, which will be enabled by coordinated infrastructure planning and supportive market arrangements."

While cautioning against further acceleration of the decarbonisation pace, Europe's electricity industry welcomed the Commission's recognition of the key role of electricity and called for measures to advance electrification.

Secretary General of Eurelectric, Kristian Ruby, said: "The backdrop of the energy transition has changed substantially. To succeed with the long-term objective of climate neutrality, it's critical to keep the support of European businesses and citizens. We therefore advocate a decarbonisation strategy that maintains a manageable pace and keeps the focus on proven technologies."

Across scenarios, the use of electricity is set to increase substantially, especially in heating and transport. Solar Heat Europe, representing the solar thermal industry, expressed its support for the target, calling for better recognition of the importance of heat decarbonisation and the contribution of EU-made and ready-to-deploy solutions like solar heat.

"Solar thermal can complement and integrate green electrification, by generating local heat, thus reducing infrastructure cost for power distribution and pressure on the grid, making the target quicker and cheaper to achieve," Guglielmo Cioni, Solar Heat Europe President.

Heat corresponds to 50 per cent of the energy needs, going up to 80 per cent for households in buildings. Providing heat through sustainable,

renewable sources and at affordable, reliable, and stable price is fully in line with the Commission's objectives, said the organisation.

The European Heat Pump Association (EHPA), while welcoming the proposal, was critical of what it saw as the role of heat pumps being "sidelined" in the Commission's communication. Decarbonising heating and cooling through electrification is seen as key to the energy transition but heat pumps "only get a few mentions in the topline communication", said the EHPA.

"After the postponement of the expected Heat Pump Action Plan, this comes as another blow to a net zero industry that is investing massively in Europe and has huge growth potential," said Jozefien Vanbecelaere,

Continued on Page 2

Europe has "turned a corner" on wind power permitting

Europe has turned a corner on the permitting of new onshore wind farms but EU member countries are still not doing enough to meet its ambitious 2030 targets, according to WindEurope.

The organisation said that Europe approved significantly more permits for new onshore wind farms in 2023 than in previous years but warned permitting remains a bottleneck.

"Permitting of wind farms improved a lot last year, especially in Germany – but there's still a way to go," said WindEurope CEO Giles Dickson. "The EU needs to build 30 GW of new wind a year to reach its 2030 goals. Current permitting volumes are not enough for that. All national governments need to implement the new EU rules and keep making their processes simpler, faster and more digital."

Germany permitted 7.5 GW, marking a 70 per cent increase from the

previous year. The contrast is even more significant when compared to 2017-2019 when less than 2 GW of permits for new projects were handed out on a yearly basis. This puts Germany on a promising trajectory to have sufficient permitted projects in the pipeline to bid into the upcoming auctions for a total of 10 GW in 2025 alone.

Spain has shown a similar trend with permits for over 3 GW granted in 2023, again a 70 per cent surge on 2022. Before 2022 permitting volumes were consistently below 1 GW.

In France, there was a 12 per cent increase in permits, reaching 2.2 GW last year. And the United Kingdom saw a 10 per cent rise, approving just over 1 GW of onshore projects. But permitting improvements are not limited to just the biggest markets. The number of permits were also up in, for

example, Greece and Belgium.

WindEurope said that this was mainly due to the Emergency Regulation on Permitting and then the new rules on permitting that were agreed as part of the revised Renewable Energy Directive (RED III). Governments have to transpose the permitting provisions from RED III by 1 July.

A key element in the new rules is Overriding Public Interest (OPI), which applies when projects get challenged in court. Crucially, it reconfirms and clearly defines which permits need to be provided within the two-year deadline. It requires governments to digitalise their permitting procedures. And for impacts on biodiversity, developers now have to take the whole population of a species into consideration instead of individual animals.

"Germany has done an especially

good job, rigorously implementing these new rules," WindEurope stated. "The application of the concept of 'Overriding Public Interest' (OPI) has already proven effective in expediting several projects entangled in legal disputes. Projects are winning court cases they used to lose. France, Portugal, and Austria have followed suit by incorporating OPI into their legal frameworks. Other countries must do the same."

BloombergNEF noted that some 55 GW of onshore wind farms are waiting to be permitted across some of Europe's biggest markets: Germany, France, Italy, Spain and the UK. That is about seven times as much capacity as those countries added last year. Waiting times can average as much as five years, more than double the limit imposed by the European Commission, BNEF found.

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Head of EU affairs at the EHPA.

Highlighting the move to greater electrification, Eurelectric also said increased societal reliance on electricity will require an equally reliable electricity sector. And with wind and solar set to become the backbone of the electricity system, “a speedy modernisation of the European grid infrastructure is needed”, it said.

At the same time, firm and flexible capacity like storage, nuclear and hydropower will be needed to complement variable renewable generation. According to Eurelectric’s assessment, the Commission analysis underestimates the need for firm and flexible technologies, assuming a significant overall reduction of dispatchable power technologies by 2040, while the share of electricity in final energy consumption increases to some 50 per cent.

Investments and new de-risking instruments will also be needed to accelerate the pace of transformation, it added.

“High-speed electrification of society requires massive investments and measures across the board. We therefore welcome the investment initiative and call on policy makers to launch an electrification action plan within the first 100 days of the new mandate,” said Ruby.

Hydrogen Europe also welcomed the 2040 target but warned of overly focusing on electrification. Under the Commission’s impact assessment, hydrogen is set to play a key role in the decarbonisation of hard-to-abate industry and transport, with production of 20 to 35 million tons (Mt) of renewable-based hydrogen expected by 2040, depending on the chosen scenario.

This would represent up to 10 per cent of the final energy demand, increasing to at least 16 per cent by 2050, demonstrating the fundamental role it will play in the energy transition with nearly one fifth of the market share.

“The Communication proposes a set of good measures that will put the work of the next Commission on the right track. However, hydrogen’s role in providing flexibility solutions and advancing sectoral integration should not be undermined by any preference for an electrification-only scenario. Only by developing hydrogen and electricity infrastructure together will we have a chance at decarbonising all sectors by 2050,” explained Daniel Fraile, Chief Policy Officer at Hydrogen Europe.



Fraile says proposal fails to consider other key roles for hydrogen

“It is alarming that the communication and assessment unfortunately fail to consider other key roles for hydrogen, such as in long-term seasonal storage, power production and heavy-duty road transport. Moreover, the model only accounts for 3 Mt hydrogen by 2030, far lower than the 10 million objective presented in the 2020 Hydrogen strategy and below the combined targets presented in the draft National Energy and Climate Plans.”

Governments ramp up hydrogen support

■ European Commission approves up to €6.9 billion of state aid by several member states

■ First tenders for hydrogen power plants in Germany

Junior Isles

Several governments around the world, mostly in the EU, made announcements last month that will boost the global effort to grow the hydrogen economy.

The most significant of those was the European Commission’s approval for up to €6.9 billion of state aid by seven member states for the third Important Project of Common European Interest in the hydrogen value chain. The funding will support the deployment of 3.2 GW of large-scale electrolyzers to produce renewable hydrogen.

The project, called “IPCEI Hy2Infra”, was jointly prepared and notified by seven member states: France, Germany, Italy, the Netherlands, Poland, Portugal, and Slovakia.

The member states will provide up to €6.9 billion in public funding, which is expected to unlock €5.4 billion in private investments. As part of this IPCEI, 32 companies with activities in one or more member states, including small and medium-sized enterprises (‘SMEs’), will participate in 33 projects.

Earlier, the Commission also approved of a €550 million Italian state aid scheme to support investments for the use of hydrogen in industrial processes to foster the nation’s transition to a net zero economy.

The aid will be in the form of direct grants and funded through the Italian

National Recovery and Resilience Plan, aligning with the Temporary Crisis and Transition Framework conditions.

The support measure will be open to companies relying on the use of fossil fuels as energy source or feedstock for their production processes in industrial sectors in Italy. Eligible projects must lead to reduced greenhouse gas emissions from production processes by at least 40 per cent or to reduce energy consumption by at least 20 per cent, compared to today.

The approval follows news that the first tenders for hydrogen power plants in Germany should take place in the first half of 2024.

A paper published by the country’s National Hydrogen Council made a number of recommendations for the power plant strategy that the federal government is preparing. These recommendations align with Germany’s broader plan to construct gas fired power plants, aiming to secure a stable power supply after the coal phase-out and switch to hydrogen power plants when the green molecule becomes available in the 2030s.

According to initial publications, the power plant strategy envisions a total of three segments – hydrogen sprinter power plants, hydrogen hybrid power plants, and hydrogen-ready power plants.

The primary allocation in the tender process is planned for hydrogen-ready

power plants and the conversion of existing facilities, initially amounting to up to 10 GW. Following evaluation, the tendered capacity could be raised to a maximum of 15 GW. During the transitional phase, natural gas or synthetic gas will be utilised before a mandatory switch to hydrogen by 2035. The council insists that hydrogen readiness should be defined precisely as a prequalification condition, accompanied by a specific set of instruments to address the additional costs associated with hydrogen.

In a recent note, ING said hydrogen holds promise as it is a substitute for fossil fuels – especially green hydrogen – but 2023 was disappointing as costs to make green hydrogen, produced using renewable energy, remain stubbornly high.

“Project developers delayed investments in earlier announced pilot projects, especially for green hydrogen. It took politicians more time to work out the complex details of policies to build and scale-up a hydrogen economy. Europe and Asia still face high energy prices, making the energy-intensive hydrogen production and transportation process a costly business. Finally, new expensive and unproven electrolyzers don’t get a lot cheaper in just one year, especially when pilot projects are postponed,” ING said.

To attain zero greenhouse gas emissions by 2050, global investments in the production and utilisation of green

hydrogen should amount to \$3.4 trillion, according to BloombergNEF’s Energy Transition Investment Trends 2024.

“In 2023, only 0.3 per cent progress toward the 2050 green hydrogen goals was achieved. It is imperative to expedite hydrogen projects as a crucial component of the energy transition,” BloombergNEF’s experts said.

Some experts argue that the future of low-carbon hydrogen hinges on global policymakers introducing regulations and subsidies that focus on the carbon intensity of the hydrogen produced rather than its colour.

Flor De La Cruz, Principal Analyst and author of Wood Mackenzie’s Horizons report ‘Over the rainbow: Why understanding full value-chain carbon intensity is trumping the colour of hydrogen’, said: “Because of its potential to deliver almost carbon-free hydrogen, green hydrogen is generating the most industry interest, but it is important exporters and developers look more closely at the full value chain as more regulation is put in place.”

■ The Philippines Department of Energy (DOE) has released a policy framework for the utilisation of hydrogen in the energy sector. The framework is based on four pillars: energy security, environmental sustainability, research and technological development, and access to financing and investments.

Biden’s pause on liquid natural gas exports could impact EU

A recent vote in the US House of Representatives to reverse US President Joe Biden’s freeze on new liquid natural gas (LNG) exports could have a significant impact on Europe’s gas supplies.

US LNG exports had skyrocketed as the US urged European allies of Ukraine to stop buying Russian natural gas and buy American. US Republican, August Pfluger, (R-Texas), said the temporary pause would send that money right back to the West’s adversaries. “Not only is President Biden cutting

off our allies at the knees, but this move will also raise global and domestic prices,” said Pfluger.

The Biden administration has not said how long the temporary pause will last but said it could allow exceptions if necessary.

The US decision to suspend the licensing of LNG exports could theoretically encourage Germany to launch the undamaged line of the Nord Stream 2 gas pipeline, Russian Energy Minister Nikolai Shulginov said following the announcement.

“The [Biden] statement was made a rather short time ago, so, they may be still considering it. I think everything will depend on what happens. Any statements, even the US ones on LNG licensing, may help them realise that US LNG exports are unstable and not guaranteed and that they should resume the process [of Nord Stream 2 certification],” Shulginov said at a press conference.

Meanwhile, the EU continues to discuss other sources of LNG. In February, a meeting of the Southern Gas

Corridor Advisory Council presented an opportunity to discuss the capacity expansion of the pipeline, which represents a crucial route of gas supply diversification.

EU Commissioner for Energy Kadri Simson said in an interview with *Trend*: “We will also discuss the role of the Southern Gas Corridor in supporting coal phase-out and diversification efforts of the EU neighbouring countries. This discussion is key in addressing regional and global energy security challenges.”

Global clean energy investment ‘not nearly sufficient’

Global investment in the low-carbon energy transition surged 17 per cent in 2023 but this is not nearly sufficient to be on track for net zero by 2050, a BloombergNEF report finds.

According to the report, energy transition investment would need to average \$4.8 trillion per year from 2024 to 2030 to align with BNEF’s Net Zero Scenario.

Albert Cheung, Deputy CEO of BNEF, said: “Our report shows just how quickly the clean energy opportunity is growing, and yet how far off track we still are... Energy transition

investment spending grew 17 per cent last year, but it needs to grow more than 170 per cent if we are to get on track for net zero in the coming years.”

The report finds that electrified transport is now the largest sector for spending in the energy transition, growing 36 per cent in 2023 to \$634 billion.

Electrified transport overtook the renewable energy sector, which saw an 8 per cent increase to \$623 billion.

This figure reflects investment to construct renewable energy production facilities, such as wind, solar and geothermal power plants, and biofuel

production plants – among other things. Power grid investment was the third-largest contributor at \$310 billion. Grids are a critical enabler for the energy transition, and investment in them will need to rise in the coming years.

Meredith Annex, BNEF’s Head of Clean Power and co-author of the report, said: “Last year brought new records for global renewable energy investment. Strong growth in the US and Europe drove the global rise, even as China, the world’s largest renewables market, sputtered, recording an 11 per

cent drop. Despite a year of tough headlines, a record amount of offshore wind capacity also reached financial close.”

A separate report from energy think-tank Ember revealed that last year the EU electricity mix reached a new milestone with more than two-thirds of electricity coming from clean sources for the first time.

Notably, wind and solar combined to produce 27 per cent (721 TWh) of total EU electricity generation. The share of fossil generation fell to its lowest ever – just a third (33 per cent) of total generation.



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Brazil focuses investment on renewable energies

- Fast-deploying wind and solar help cut carbon emissions
- Petrobras investigates green hydrogen

Janet Wood

Brazil's federal government recently announced that 2023 saw carbon emissions in its electricity generation sector at their lowest for 11 years. On average, the National Interconnected System (SIN) produced 38.5 kg/MWh, down from 61.7 kg/MWh in 2022 and more than 100 kg/MWh in earlier years.

The Ministry of Mines and Energy said this was due to more clean sources in the energy matrix, actions to reduce the use of fossil plants and the favourable conditions for hydropower.

In 2023, 93.1 per cent of all electricity produced came from hydroelectric, wind and solar power plants. However, the biggest expansion in the energy grid has come from wind and solar power plants.

Last year alone, Brazil's power generation capacity increased by around 10.3 GW, with 69 per cent of the increase from 140 new wind farms. The scale of new wind capacity is highlighted by Norway's Statkraft, which inaugurated its largest wind farm outside Europe, the 519 MW Ventos de Santa Eugênia complex.

Christian Rynning-Tønnesen, CEO of Statkraft, said that the development places Statkraft among the 10 largest wind companies in the Latin America's most important energy market, with significant value creation potential. This project, among Brazil's first hybrids, will also integrate a planned 163 MW solar farm and a battery.

A quarter of Brazil's new electricity generation capacity came from 104 new solar PV plants.

In 2023, solar PV uptake in Brazil grew at a rate of more than 1 GW per month and the cumulative installed

PV capacity reached over 37 GW. Some 70 per cent of the new capacity came from rooftop pv. The technology was supported by favourable net metering legislation, rising conventional electricity tariffs and consistent and strong downward trends in photovoltaic equipment prices.

With renewable generation booming, Brazil's state-run oil and gas company Petrobras has recently joined forces with renewable energies innovation institute SENAI-ER to build a pilot electrolysis plant to study aspects of the green hydrogen value chain.

Petrobras will invest \$18.1 million in the three-year project, it said.

The new facility will use the output from Petrobras' Alto Rodrigues solar PV project, located in Rio Grande do Norte state, which will be expanded to 2.5 MWp to meet the power demand of the pilot electrolysis plant.

"Among the benefits to the company is the development of knowledge about equipment behaviour caused by the hydrogen and natural gas mixture to create business models of interest to the company," said Jean-Paul Prates, President of Petrobras.

Hydro-Quebec tender brings forward eight wind farms

Canadian utility Hydro-Québec is moving forward with eight onshore wind projects totalling 1550 MW to help meet future electricity needs.

The company's Electricity Supply Plan 2023-2032 foresees electricity demand growth of 25 TWh, largely to electrify transport but also to supply new sectors of economic development, many of which are linked to the energy transition.

Quebec already has 49 wind farms in operation totalling 4 GW and in March 2023 Hydro-Québec launched a tender for 1.5 GW of additional wind capacity. It received 16 proposals totalling 3 GW. It should be noted that an important component of the call for tenders was that these projects had local community support and that

they were to be developed in partnership with the local community or indigenous communities.

The new wind farms are due to be commissioned between December 2027 and December 2029.

Michel Lagacé, President of Alliance de l'énergie de l'Est, said: "Eastern Quebec, with its wind regimes favourable to wind development, wants to continue its important contribution to building new megawatts, allowing us both to contribute to Québec's energy leadership and to ensure the vitality of our territory."

The company is delivering the 291 MW Pohénégamook-Picard-Saint-Antoine-Wolastokuk 2 (PPAW 2) wind power project in partnership with Invenergy.

US offshore wind companies restructure

US utility Eversource Energy is exiting the offshore wind business and has announced that it will sell its half share in the 132 MW South Fork Wind and 704 MW Revolution Wind offshore projects to Global Infrastructure Partners (GIP).

"Eversource will remain an integral player in this historic shift to a clean energy generation mix by focusing on our strengths as a regulated transmission [system] builder and operator," said Eversource's Chief Executive Joe Nolan.

The \$1.1 billion deal follows Eversource's January agreement to sell its 50 per cent holding in the 924 MW Sunrise Wind project to Ørsted, which

also holds the remaining half share of South Fork Wind and Revolution Wind.

In further US offshore wind restructuring, Iberdrola is negotiating the sale of a minority stake in its US renewable portfolio to Masdar. Iberdrola has been exploring a transaction with its North American renewables business, under the umbrella of its subsidiary Avangrid, for nearly a year for the sale of up to half the company.

Masdar, owned by the Abu Dhabi sovereign wealth fund, previously joined with Iberdrola in a \$15 billion deal to invest in offshore wind and green hydrogen in Germany, the UK and the US.

Solar advocates hail boom in US installations

- Texas set to see largest gains
- Florida utility uses solar for hydrogen production

Janet Wood

Solar and battery storage will make up the vast majority of new utility-scale electric-generating capacity projects expected in the USA this year, according to new data from the US Energy Information Administration (EIA).

Developers and power plant owners plan to add 62.8 GW of capacity in 2024, the EIA said, of which 81 per cent will be solar and battery storage projects, according to the data. New solar capacity will be 36 GW. EIA called the projected solar additions record breaking, saying projected additions in 2024 would nearly double last year's gains at 18.4 GW. That was despite the fact that new solar PV in 2023 represented 49.3 per cent of additions to domestic generating capacity, and more than the combined new capacity from natural gas (11 GW) and wind (6 GW).

Texas is expected to see the highest number of new projects this year (35 per cent of the total). In 2023 total solar output in Texas's ERCOT region was nearly 50 per cent greater than in 2022. California had the second highest tranche of new projects (10 per cent of the total).

The SUN DAY campaign said the new additions have brought solar's share of total available installed generating capacity up from 6.4 per cent at the beginning of 2023 to match hydropower at around 9 per cent of the total.

The campaign said: "The numbers for solar may prove to be conservative" as FERC reports that there may be as much as 218 GW of new solar additions in the three-year pipeline.

"Solar ended 2023 by setting a record-high number of installations in December and providing half of the nation's new generating capacity for

the year while pulling even with hydropower," noted the SUN DAY Campaign's Executive Director Ken Bossong.

Florida Power & Light is using solar power in its newly completed clean hydrogen plant in Florida. The FPL Cavendish NextGen Hydrogen Hub uses solar power from a local plant. The hydrogen produced is then compressed, stored and blended with natural gas. For this project, a 5 per cent blend of hydrogen will be tested in one of the three natural gas combustion turbines on site.

FPL said the aim is to help FPL "explore low-cost, clean energy options for customers". FPL President and Chief Executive, Armando Pimentel, said: "Today marks another important step forward as we further our commitment to fostering a clean and cost-effective energy future that benefits our customers and Florida."

Mexico a key target for renewables developer

Cubico Sustainable Investments has expanded its development portfolio in Mexico through the acquisition of Renantis Mexico and a strategic agreement with Sowitec Group.

The company's development pipeline in Mexico is now more than 1.6 GW and its three operational projects, Mezquite and Solem 1 and 2, bring its Mexican portfolio to 2.2 GW. Cubico said this reflects its "strong commitment to expanding its renewable energy platform in the country."

Oswaldo Rance, Country Head for

Mexico at Cubico Sustainable Investments, commented: "We are delighted to announce the completion of these two transactions which reinforce our commitment to delivering projects that will contribute to both reducing greenhouse gas emissions and driving Mexico's future economic growth. We are confident that these projects will play a vital role in meeting the growing demand for clean energy in the region. Looking ahead, we will be seeking both public and private off takers. Cubico Sustainable Investments is

backed by Ontario Teachers' Pension Plan and Canadian pension investment manager PSP Investments. Cubico's global portfolio in ten countries now claims an installed gross capacity of more than 3 GW, with nearly 700 MW in construction and a 5 GW development pipeline.

Renewable energy developer Sowitec operates in 12 countries, primarily concentrating on emerging markets, and has a portfolio of over 60 wind and solar projects, totalling nearly 3 GW.



Environmentalists criticise Indonesia on green investment regulations

- New green investment rulebook includes coal fired power plants
- Ministerial revision could slow rooftop solar

Syed Ali

Indonesia has come under fire for recent rulings that promote the use of coal and slow the growth of rooftop solar.

Last month the government launched a revised 'taxonomy' or green investment rulebook categorising coal fired power plants used in nickel facilities as part of the global transition to a green economy. The new taxonomy was a revision to a 2022 document defining what is considered a sustainable investment in support of Indonesia's pledge to achieve net-zero emissions by 2060.

Environmentalists criticised the notion of categorising the financing of new coal power plants as sustainable when the possibility was first raised by authorities last year.

The taxonomy a the traffic light system, under which sectors labelled 'green' are interpreted as aligned with

efforts to meet climate goals, 'amber' for sectors supporting the transition to low carbon economy, and 'red' for those that harm the environment.

Under the new taxonomy, an investment in captive coal power plants—off-grid plants developed and managed by industries for their use—is labelled amber as long as it meets certain criteria. The captive plants must be built before 2031, be shut down before 2050, and commit to cut carbon emissions by 35 per cent within 10 years of operation from 2021's average.

The taxonomy also labelled green investments in early retirement of existing coal power plants, which Indonesia has been trying to do under a G7-led climate funding initiative known as the Just Energy Transition Partnership.

Meanwhile, a recent revision to a ministerial regulation on rooftop solar

has also come in for criticism.

Locals argue that the government's newly approved revision to Energy and Mineral Resources Ministerial Regulation No. 26/2021 on on-grid solar systems and energy distribution businesses makes installing rooftop solar panels at residential homes even less attractive than before.

The revised rule scraps a previous provision that allows residential users of rooftop solar panels to sell their surplus solar energy to state-owned electricity firm PLN for a reduction on their electricity bill, thereby speeding up their return on investment.

Anak Agung Bagus Putra Utama, a user in Bali, told *The Jakarta Post*: "My electricity bill could be cut 70 per cent by installing on-grid solar [system]. But with the export stipulation gone and the enactment of a quota, who will be interested?"

The government defended the move, pointing to a need to protect state-owned electric utility PLN from the risks of renewable energy intermittency. The revised rule would also allow PLN to focus on addressing the electricity oversupply on Java and Bali due to the over-development of coal fired power plants.

Solar proponents say the revision also saddles future adopters with complicated bureaucratic procedures.

Fabby Tumiwa, Executive Director of the Indonesian Solar Energy Association (AESI) said that the new quota system would allow only a limited number of users to connect to the PLN grid, which had a fixed capacity. This could present a problem in the future, he added, as PLN and the government might not update the quota for a particular region after it had been exhausted by users.

Meanwhile, activities have now kicked-off on the Master Plan for Energy Transition Management Project in Indonesia. Work was able to begin after four Japanese companies—JERA Co., Inc. (JERA), Tepco Power Grid, Inc. (Tepco PG), Tokyo Electric Power Services Co., Ltd. (TepSCO), and Mitsubishi Research Institute, Inc. (MRI)—concluded an agreement with the Japan International Cooperation Agency (JICA).

Indonesia has set a goal of achieving carbon neutrality by 2060, making decarbonisation of its electric power sector, which accounts for approximately 40 per cent of the country's total CO₂ emissions, an important issue. Given the existing energy mix, the government of Indonesia requested the government of Japan for assistance in developing an energy transition master plan.

Australia marks hydrogen milestone as it pivots to clean energy

Australia has marked an important milestone in its transformation to clean energy with the opening of its first dual-fuel gas and green hydrogen capable power plant.

In February GE Vernova's Gas Power business announced the opening of the Tallawarra B Power Station, in New South Wales, where a 9F.05 gas turbine has become the first dual-fuel capable natural gas/hydrogen power plant to begin commercial operation in Australia.

Tallawarra B, owned by EnergyAustralia, is expected to operate on a blend of 5 per cent (by volume) green hydrogen and natural gas in 2025, subject to the development of a hydrogen manufacturing industry of an appropriate size and scale. According to GE Vernova, the project is also expected to be the first 9F gas turbine to operate on a blend of natural gas and hydrogen globally.

"Tallawarra B is the first gas fired power station built in New South Wales in over 10 years. The new station will play a vital role in the energy transition, providing flexible and reliable energy during periods of peak demand or low supply. Tallawarra B enables and complements more renewables entering the system as coal fired power stations retire," said Mark Collette, Managing Director of EnergyAustralia.

The news comes as coal fired generation across the country comes under increasing pressure to close.

Last month the Victorian Greens proposed imposing a new levy on Victoria's three polluting coal power stations to help pay for climate damage, after hundreds of thousands of Victorians were left without power following a devastating storm and bushfires.

Victorian Greens spokesperson for coal transition, Dr Tim Read, said it

was now time to start holding the corporations that overwhelmingly contribute to climate change, responsible for the resultant climate disasters through imposing a new 'coal climate' levy.

He said that as electricity is a regulated industry, the Essential Services Commission has appropriate powers to ensure a tax would not be passed on to Victorian energy consumers.

Meanwhile Victoria is continuing with ramping up renewables. February saw the installation of the first turbine at the initial 756 MW stage of TagEnergy SA's Golden Plains Wind Farm.

The V162-6.2 MW machine by Denmark's Vestas Wind Systems will form part of a 122-turbine park, set to become Australia's largest onshore wind park. The site will be later expanded into a 1.3 GW complex that will be capable of producing over 4000 GWh of electricity annually, or enough to supply over 750 000 local homes.

Elsewhere, Cubico Sustainable Investments (Cubico) and Stanwell Corporation (Stanwell) confirmed the second stage of the Wambo Wind Farm in Queensland, a pivotal development set to increase the project's final renewable energy generation capacity to over 500 MW. Stage 2 will integrate 41 additional turbines, increasing the generation capacity of the project by an additional 254.2 MW upon its completion in 2026.

David Smith, Country Manager for Australia, Cubico, commented: "As Australia's energy transition accelerates, we are proud of our leading role enabling Queensland to achieve its ambitious renewables goals. With over 2 GW of projects in development, Cubico is committed to being a key partner in the decarbonisation of Australia's energy landscape."

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Philippines takes next step to nuclear revival

The Philippines Department of Energy (DOE) will soon create a committee dedicated to building a 2400 MW nuclear power plant by 2032, some four decades after mothballing a plant that never began operation.

The new committee will be part of the project's Phase 2, following the completion of Phase 1, which involves the initial plans and various studies on establishing a power plant programme created by the DOE-Nuclear Energy Power Implementing Organisation.

Phase 2 is the preparatory work for the construction of a nuclear power plant, while Phase 3 involves the activities to implement a first nuclear power plant.

The Philippines has only one nuclear power station: the Bataan Nuclear Power Plant (BNPP). It was started in the mid-1970s by late president Ferdinand Marcos Sr. and finished construction in 1984.

However, because of financial constraints and safety concerns, the plant was never fuelled and its reactor was never turned on. The 1986 Chernobyl nuclear accident proved to be the final nail in the coffin.

In March 2022, however, former President Rodrigo Duterte issued Executive Order (EO) 164, allowing the inclusion of nuclear power in the country's energy mix, following the recommendation of the NEP Inter-agency Committee (NEP-IAC).

The DOE Nuclear Energy Power Program Coordinating Committee (DOE-NEPCC) is to be led by two undersecretaries as chairperson and vice-chairperson.

The committee's responsibility as a coordinating arm will include conducting studies and programmes. Moreover, NEPCC will be providing recommendations on addressing issues concerning the design and operation of nuclear power plants.

Commenting on the creation of the committee, Bienvenido S. Oplas, Jr., President of the free market think-tank Minimal Government Thinkers, said: "Hopefully this will hasten the clearing and approval of nuclear power construction and commissioning in the Philippines."

Oplas said that the Philippines should move fast in nuclear development because of "economic imperatives". At a gross domestic product growth rate of 6 per cent, the Philippines will require about 7-8 TWh of power yearly until 2030, he said.

The DOE has revised its energy roadmap to incorporate a clean energy scenario in the 2023-2050 Philippine Energy Plan, which envisions "a more diverse energy mix that includes nuclear energy".

Nuclear power is seen as a zero-emissions baseload generating technology that complements the growth of variable renewable energy.

Clean energy drives China's economic growth

Clean energy has emerged as the main driver behind China's economic growth in 2023, according to analysis by Carbon Brief.

According to the research, clean energy sectors accounted for 40 per cent of the expansion in GDP for the year. Without this substantial growth, China's GDP would have fallen short of the government's target growth rate of "around 5 per cent", with growth projected at 3.0 per cent instead of the achieved 5.2 per cent.

When considering the production value, clean energy sectors contributed a CNY11.4 trillion (\$1.6 trillion) to the Chinese economy in 2023, marking a 30 per cent increase compared to the previous year.

According to the data China has recorded a 40 per cent year-on-year increase in clean energy investment amounting to CNY6.3 trillion (\$890 billion). Notably, three sectors – solar power, electric vehicles (EVs), and batteries – have been the main growth drivers.

According to data released by the National Energy Administration, China has achieved a milestone in its energy landscape, with newly commissioned energy storage projects boasting a cumulative installed capacity of 31.39 GW by the end of 2023. This figure represents a growth of over 260 per cent compared to the previous

year-end, and nearly ten times the capacity recorded after the 13th Five-Year Plan (2016-2020).

Since the initiation of the 14th Five-Year Plan, this burgeoning sector has directly spurred economic investments exceeding CNY100 billion.

The country's clean energy sector is also proving attractive to international partners. In February Russian metals group EN+ reported that it is considering the construction of a wind farm in the far-eastern region of Amur, and could tap Chinese companies for a factory that could produce 6 MW turbines.

The planned 1 GW wind farm in the region bordering China would involve an investment of some Roubles60 billion (\$659 million), Russia's Far East and Arctic Development Corporation said.

As part of its emissions reduction and energy security plan, China has also included nuclear as an important part of its future energy mix. Late last month the nation started construction of the first phase of a nuclear power plant that will consist of six domestically developed Hualong One third generation reactors.

The Jinqimen power plant will require an investment equivalent to \$6.2 billion and is expected to have an installed capacity of 7200 MW when the six reactors are active.



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Europe News

Small steps forward on new nuclear stations

- Czech companies aim to win AP1000 work
- UK, Bulgaria, Sweden working on plans

Janet Wood

Westinghouse Electric Company and construction partner Bechtel recently signed a cooperation agreement with the Czech Power Industry Alliance that will leverage the Czech Republic's highly skilled nuclear industry in support of the companies' proposal to deploy AP1000 reactors in the country.

The agreement establishes a working group to facilitate participation of Czech companies in the deployment of up to four AP1000 reactors at Dukovany and Temelin.

"We see the signing of this agreement as a very important step in the mutual cooperation of all parties involved. The working group's efforts will ensure maximum involvement of the Czech industry in the construction of new nuclear power sources in the Czech Republic as a truly strategic partner of the AP1000 technology," said Josef Perlik, Alliance Executive Director.

Elsewhere, five companies have shown interest in building two new reactors using the AP1000 technology at Bulgaria's state-owned Kozloduy

nuclear power plant, the special project company Kozloduy NPP-New Build said in a statement. Bulgaria's energy ministry said last year that it will start the procedure to choose a contractor for the design, construction and commissioning of two new units.

New nuclear plans have also firmed up in Sweden and the UK. Swedish utility Vattenfall said recently it was aiming to put a new nuclear reactor into commissioning in the first half of the 2030s.

"We have concluded that there are good conditions for building new

nuclear power on the Varo peninsula, but that it is too early to choose the type of reactor," Desiree Comstedt, Vice President of New Nuclear at Vattenfall, said in a statement. "The ambition to have a first reactor in operation by the first half of the 2030s remains," Comstedt added.

In the UK, Centrica Plc has said it is considering investing in the planned UK nuclear power plant at Sizewell C, making it a potentially key stakeholder in the British government's plans to draw private investors to build the project. "We could be interested

in investing in that, but the risk and reward return has to be right," Centrica Chief Executive Officer Chris O'Shea told Bloomberg. "That is a possible future investment for Centrica, but it has to be on the right terms."

Elsewhere in the UK, state-owned Great British Nuclear is in early-stage discussions with Hitachi, owner of a nuclear site at Wylfa in Wales. Great British Nuclear wants to buy the site with a view to finding a new private sector partner to develop a station there.

Faroe Islands site could see tidal power step up

Tidal power company Minesto has proposed building out its technology at seven locations in Faroe Island waters to provide 200 MW of capacity, equivalent to about 40 per cent of the island group's future energy demand. The Faroe Islands is aiming for 100 per cent renewables by 2030.

Dr Martin Edlund, Minesto Chief Executive, said new tidal energy resources have been verified, and the demand for clean energy from local stakeholders such as the Faroese fish farming industry is growing. He said: "In addition to increasing energy demand, a larger investment case at 200 MW increases attractiveness for investors based on improved economies of scale."

The proposals for a commercial array

build-out follow a successful commissioning of Minesto's 1.2 MW Dragon 12 tidal energy kite technology. The 12 m wide, 28 t subsea kite, tethered to the seabed, is up to ten times the size of the existing 100 kW Dragon 4.

Minesto estimates the 200 MW project investment required is €400 million. Its roadmap targets Hestfjord as the first site for build-out, where Minesto and local utility partner SEV is engaged in site development activities such as consenting and planning of cable routes.

"This is a big day for Minesto. We have reached the most significant milestone in the history of the company by producing electricity to the grid with our mega-watt scale powerplant," Edlund said.

Dogger Bank offshore wind farm faces delays

SSE Renewables, the developer of the UK's Dogger Bank A offshore wind farm, has warned of likely delays in the first phase of the project. In a trading statement SSE said that turbine installation on Dogger Bank A has been affected by challenging weather conditions, vessel availability and supply chain delays.

"Following notification of further vessel unavailability over the coming weeks there is an increasing possibility that full operations will not be achieved until 2025, although this is not expected to materially change project returns. The business is working closely with its supply chain partners to improve current turbine installation rates," SSE said.

Power was generated from the first GE Vernova Haliade-X13MW turbine at the site in 2023. In February seven turbines out of the expected total of 95 had been installed at the site.

The 3.6 GW Dogger Bank Wind Farm is being constructed in the UK's North Sea, off the coast of Yorkshire. It is being built in three 1.2 GW phases known as Dogger Bank A, B and C.

According to new data from energy think-tank Ember, wind power production surpassed gas fired power plants in Europe for the first time in 2023. It said European companies are reporting a positive outlook as wind energy outpaces other sources, despite recent challenges to the offshore industry.



Batteries lead storage development

- New projects across European countries
- Gravity technology could be deployed in Finland

Janet Wood

Battery energy storage in Germany will increase to 15 GW/57 GWh by 2030 and 60 GW/271 GWh by 2050, if an enabling policy framework is in place, according to a recent study.

The Frontier Economics study, commissioned by Fluence, BayWa r.e., ECO STOR, Enspired and Kyon Energy, said that by deploying storage, Germany could reduce by 9 GW the capacity of new gas fired power plants it will need to build by 2030.

"Large-scale battery storage is critical for the energy transition in Germany. Without the flexibility provided by storage, the country will face higher economic costs caused by increasing gas imports and expensive curtailment of renewable generation," said Christoph Gatzert, Director at Frontier Economics.

Battery projects continue to be awarded contracts across Europe. Greece has a programme to install 1 GW of battery storage and it has

awarded contracts to 11 battery projects totalling 300 MW in its second energy storage tender. This second auction comes after the initial round of auctions in August 2023, when 12 projects totalling 411 MW were commissioned. A third round is planned for April 2025, with the goal of allocating an additional 300 MW.

In the UK, Queequeg Renewables recently announced plans for more than a dozen renewable and storage projects, in addition to a new 40 MW battery energy storage facility near Stockport, Greater Manchester.

"The UK is one of the most advanced markets in the world for distributed energy projects," said Mark Roberts, Project Development Director at Queequeg Renewables. "These projects are key to the UK's energy transition in accordance with its net zero targets."

TagEnergy recently reached financial close on a sixth battery in the UK on a fully merchant basis, financed under a non-recourse green loan package of up to £70 million from lenders

Santander UK, Rabobank, and Triple Point.

However, developing other forms of storage that can operate over longer timescales continues to be a priority for markets.

Edinburgh energy storage firm Gravitricity recently announced a plan to transform a disused shaft into an underground energy store using its GraviStore technology. The system raises and lowers heavy weights in underground.

The local community at its new project site in Finland has set up a special development company, called Callio Pyhäjärvi, to promote regeneration projects at a historic mine, of which the GraviStore scheme will be part.

Gravitricity's Executive Chairman Martin Wright said: "This project will demonstrate at full scale how our technology can offer reliable long life energy storage that can capture and store energy during periods of low demand and release it rapidly when required".

UK joins withdrawals from "outdated" Energy Charter Treaty

The UK is set to become the tenth country to withdraw from the Energy Charter Treaty (ECT) after the failure of efforts to align it with net zero targets.

Signed in 1994, the Energy Charter Treaty was designed to promote international investment in the energy sector, historically providing protection

for investors in fossil fuels. After two years of negotiations, in 2022 the UK helped broker an agreement to modernise the ECT. This would have maintained its current benefits and extended protection to renewables, hydrogen and carbon capture and storage. However, this led to an impasse and the

modernised ECT was rejected by nine EU members. European Parliament elections in 2024 mean modernisation could now be delayed indefinitely.

Energy Security and Net Zero Minister Graham Stuart announced in September 2023 that the UK would be reviewing its membership of the ECT

if plans to update it were not adopted.

Minister of State for Energy Security and Net Zero, Graham Stuart, said: "The Energy Charter Treaty is outdated and in urgent need of reform but talks have stalled and sensible renewal looks increasingly unlikely.

"Remaining a member would not

support our transition to cleaner, cheaper energy, and could even penalise us for our world-leading efforts to deliver net zero."

After considering views from businesses, industry and civil society, ministers will instigate the UK's withdrawal, which will take effect after one year.

IEA calls for six-fold increase in EMDE clean energy investment

- Emerging and developing markets need much more investment
- Cost of capital must fall to avoid fossil fuel 'lock-in'

Nadia Weekes

Capital flows to clean energy projects in emerging markets and developing economies (EMDEs) are 'worryingly low', according to a recent report by the International Energy Agency (IEA), putting green schemes in these countries at risk.

The IEA's 'World Energy Investment 2023' report highlights the need for a significant increase in investment in clean energy technologies such as solar photovoltaic (PV), wind, grid infrastructure, storage and energy efficiency in EMDEs if the world is to achieve the Paris Agreement goal of limiting global warming to 1.5°C.

Several factors are contributing to the increased cost of financing clean energy projects in EMDEs, according to the report. They include political instability, currency fluctuations, regulatory uncertainty, and the lack of access to

grids. As a result, investors are finding it difficult to assess the risks associated with investing in clean energy projects in these countries, leading to higher costs of financing.

The IEA report found that the cost of capital for utility-scale solar PV projects in EMDEs ranges from 9 per cent to 12 per cent, against costs of 5-6 per cent in advanced economies. This creates a clear disadvantage for clean energy projects in EMDEs, as they must pay more for the same project or forgo it entirely.

Closing the cost of capital gap by 1 percentage point could save \$150 billion per year in clean energy financing costs for EMDEs, the IEA's analysis indicated.

One way to reduce the cost of capital for EMDEs is to triple concessional funding, the report suggests, which is money that is lent or given at below-market interest rates. This could be

used to remove barriers to investment and help improve the risk-return profile of clean energy projects.

In addition to concessional funding, the IEA recommended the use of guarantees to counteract payment delays by off-takers and investing in grid infrastructure, to make project timelines more predictable.

The transition from dollarised, globally traded commodities such as oil to locally produced clean energy requires a stable domestic business environment, the report argues. If countries cannot afford the upfront costs of clean energy projects, they may be locked into less expensive but more polluting technologies that require ongoing investment in fossil fuels.

Scaling up private sources of financing is crucial to making clean energy projects in EMDEs more appealing to investors. European Investment Bank (EIB) figures indicate that multilateral

development banks mobilised just \$18.6 billion in private finance in 2022, compared with \$60.9 billion in green lending to EMDEs.

Fatih Birol, the IEA's Executive Director, noted that reducing risk through clear and timely regulation is a crucial first step to attracting investment in clean energy projects in EMDEs – but called for a concurrent increase in financial and technical support from the international community.

"We have to build new bridges between investors looking for clean energy opportunities and the markets where this investment is most needed," Birol said.

According to the IEA, the current level of investment in clean energy in EMDEs is just \$270 billion per year. The IEA's pathway analysis suggests that investment must rise to \$870 billion by the early 2030s in order to meet national climate and energy pledges,

and to \$1.6 trillion to limit global warming to 1.5°C.

The IEA suggested that utility-scale solar and wind projects should receive around a quarter of the total clean energy investment over the next decade, with another quarter going to improvements in electricity networks and efficiency in buildings.

Meanwhile, the EIB's board of directors has greenlighted €1.6 billion (\$1.72 billion) of new financing to support renewable energy generation and strengthen electricity distribution networks as part of a broader energy transition package.

In EMDEs, the EIB will back new wind and photovoltaic investments across South Africa and financing to enable the increased use of solar power for agriculture, irrigation and water treatment, as well as to power schools, health centres and hospitals across West Africa.

Zimbabwe plans 200 MW wind power plant

Zimbabwean developer Optate Africa and global wind turbine manufacturer GE Vernova have announced plans to install a 200 MW wind power plant near Plumtree in Mangwe District, southwestern Zimbabwe.

The developer has sought a 25-year lease from Mangwe Rural District Council for 100 hectares of land to set up the facility, which is intended to help the country meet its power demand while reducing dependence on fossil fuels for electricity generation.

According to Optate Africa, some of the power generated by the project will be sold to the Zimbabwe Electricity Transmission and Distribution Company (ZETDC) under a 25-year power purchase agreement (PPA), with the remainder being supplied to the Southern African Power Pool (SAPP).

A social impact assessment for the project has already been completed, with permission granted by commu-

nity elders in Bulilima. An environmental impact assessment will be pursued next.

Wind energy is largely untapped in Zimbabwe but in 2022 the government revived plans to develop it as it continues to seek ways to meet growing power demand.

The Zimbabwe National Renewable Energy Policy, launched in 2019, set the target of achieving 1.1 GW of renewable energy capacity – representing a 16.5 per cent share of the country's electricity supply by 2025.

The policy also aims to achieve 250 000 solar geysers, to increase the use of the institutional and domestic biogas digesters, and to promote the use of solar mini-grids and solar water pumping solutions.

To encourage investments into renewables, Zimbabwe is offering incentives including duty and tax exemptions, alongside prescribed asset status to pension and insurance companies.

Rosatom plans wind and hydro power plants in Kyrgyzstan

Russia's State Atomic Energy Corporation (Rosatom) plans to build wind farms in the Issyk-Kul and Batken regions of Kyrgyzstan, with a capacity of approximately 100 MW and 80 MW, respectively.

After making the announcement at the 'Green Energy: Optimising Energy Balance' event organised by the Ministry of Energy of Kyrgyzstan and Rosatom, the company's Director for Central Asia in Kyrgyzstan, Dmitry Konstantinov, said Rosatom has

already begun investing in the implementation of these projects.

Rosatom has plans to build several hydroelectric power stations in Kyrgyzstan, with the support of the Russian-Kyrgyz Development Fund, Konstantinov added.

This includes construction of the Chandalash hydropower plant, with a capacity of up to 30 MW, in collaboration with Elbrus. Currently, efforts are under way to find co-investors in the project.



- Allocation of 7.5 GW to companies already achieved
- First phase of electricity supply from Jordan nears completion

Nadia Weekes

Iraq's aim to deploy around 12 GW of solar capacity by the end of 2030 is moving forward following government approval of a plan and the allocation of about 7.5 GW to companies, according to reports in the *Iraqi News Agency (INA)*.

National Investment Commission adviser Rahim Al-Jaafari said the commission is in the process of completing the procedures for granting investment licences and starting work.

As a signatory to the Paris Agreement, Iraq has committed to shifting from fossil fuels to renewable energy, Al-Jaafari noted. He added that a trial to produce electricity from around 3000 tonnes of waste will be conducted in the Nahrawan district, east of Baghdad.

Meanwhile, Iraq and Jordan are advancing plans to supply Baghdad with electricity from Jordan, with a capacity of 40 MW in the first phase, alongside an agreement to set up a 132 kV

connection line to meet the power demands of the Rutba area.

The two countries have agreed a framework to begin establishing joint synchronous electrical interconnection to enhance the exchange of electrical energy and stabilise the electrical systems on both sides – a significant part of a future Arab common energy market.

Jordan's General Manager of the National Electric Power Company, Amjad Rawashdeh, said that all technical procedures for the first phase have been completed, and the Iraqi side is now ready to receive electricity.

After the first phase is completed, preparations will begin for the second phase, culminating in Iraq being supplied with a total capacity of 150-200 MW, Rawashdeh added. Subject to the development of connection phases in the medium term, supply could rise to 500 MW.

Iraq has been making efforts to expand its electric connectivity with neighbouring countries, especially Jordan and Saudi Arabia, to reduce its

dependence on electricity and gas imported from Iran.

In 2018, the Iraqi Ministry of Electricity and Jordan's Ministry of Energy and Mineral Resources signed a memorandum of understanding to cooperate in electricity and establish a synchronised electrical interconnection network.

In 2020, the two countries agreed that Jordan would supply Iraq with an electrical capacity of 150-200 MW. A year later, they signed a mechanism for implementing the interconnection project through the construction of a 400 kV overhead transmission line linking the al-Risha substation on the Jordanian side with the al-Qaim substation on the Iraqi side.

In October 2023, Iraqi Prime Minister Mohammed Shia al-Sudani and Jordan's Prime Minister Bisher Khasawneh laid the foundation stone for the electrical interconnection project.

Iraq suffers from electric power shortages dating back to the 1990s, after the second Gulf War in 1991 destroyed several power stations.

Turbine manufacturers find favourable winds

■ Vestas returns to profitability ■ Nordex calls 2023 “a transition year”

Junior Isles

Several major European wind turbine manufacturers have reported positive financial results in what seems to signal a change in fortunes for a sector that has been experiencing challenging market conditions.

Danish wind energy giant Vestas saw a return to profitability, reporting a strong performance in 2023, with revenue reaching €15 382 million. This surpassed the outlook range of €14.5-15.5 billion and represents an increase in profit of 105 per cent for 2023 compared to the previous year.

Vestas reported an EBIT margin before special items of 1.5 per cent, exceeding expectations, and total investments of €823 million. The combined order backlog across Power Solutions and Service surged to €60.1 billion.

The company saw a record order intake of 18.4 GW last year “driven by strong growth in both offshore and onshore, especially in the USA”. It said the revenue was driven by higher pricing and continued growth in its Service business segment. The increase in order intake was driven by growth in both onshore and offshore markets, with “a record-setting fourth quarter”.

Henrik Andersen, Vestas’s Group President & CEO, said: “Vestas’s performance improved throughout 2023, and we are pleased that Vestas returned to profitability and achieved the upper end of our guidance.”

Looking ahead to 2024, Vestas expects revenue to range between €16 billion and €18 billion, including Service revenue.

Andersen added that the improving

business environment helped the company’s performance in 2023, but warned that continued geopolitical volatility, slow permitting and insufficient grid build-out across markets were expected to cause uncertainty in 2024.

Vestas’s main European rival Siemens Gamesa continued to turn its struggling business around with the completion of the sale of its 32 per cent shareholding in Spain’s Windar Renovables to Bridgepoint. The sale was first announced in May of last year.

Bridgepoint is a quoted private asset growth investor, specialised in private equity and private debt. The parties have agreed not to disclose the purchase price.

Siemens Gamesa said that this sale is only logical for them, as it is important to focus on the absolute core business,

as the priority at Siemens Gamesa is to achieve the turnaround.

“It is part of our strategy to divest non-core activities and to focus on our core businesses: design, manufacturing, installation and maintenance of wind turbines. This is what we are working on, step by step, to become a reliable and profitable company,” said Jochen Eickholt, Siemens Gamesa’s CEO.

Meanwhile, German wind turbine manufacturer Nordex published its preliminary results for fiscal year 2023, which confirm its guidance for the year.

According to preliminary numbers, the company recorded increased consolidated sales of €6.5 billion (previous year: €5.7 billion) and exceeded the upper end of the forecast range of €5.6-6.1 billion. Earnings before interest,

taxes, depreciation, and amortization (EBITDA) reached break-even on a full-year basis at €2.0 million (previous year: minus €244 million). This corresponds to an EBITDA margin of zero per cent (previous year: minus 4.3 per cent) and is broadly in the middle of the guidance range of minus 2 to plus 3 per cent.

Nordex ended the year with a solid order intake of 7.4 GW (previous year: 6.3 GW) while maintaining stable prices with a promising order outlook.

José Luis Blanco, CEO of the Nordex Group, commented: “2023 was a transition year with a step-up in the right direction. Looking back, business performance has developed as assumed at the beginning of the year. After a weak start, as expected, we gradually improved each quarter with a stronger second half of the year.”



Ørsted, the world’s largest offshore wind farm developer, has suspended its dividend and slashed targets as it attempts to recover from a difficult last 12 months and restore investor confidence.

In February the Danish company said it will cut up to 800 jobs, suspend its dividend and slash growth targets for renewables. Chief Executive Mads Nipper said the moves were necessary to turn Ørsted into a “leaner and more efficient company”. It aims to reduce fixed costs by DKr1 billion (\$144 million) by 2026.

Ørsted’s shares, listed in Copenhagen, have fallen more than 70 per cent since peaking at the start of 2021. Its problems are the result of rising interest rates and supply chain constraints that have pushed up costs across the offshore wind industry. Rising interest rates have a stark impact on offshore

wind projects, which typically have high upfront costs.

Speaking to the *Financial Times*, Nipper said: “The fuel of renewable energy is capital. Financing £8.5 billion – 25 basis points matter and 100 matter a whole lot more. For a company like ours, if interest rates go up by 3 per cent that more than eliminates all the profit of a huge investment.”

Nipper warned that the sector’s growth would slow down “dramatically” unless the price that developers are paid for their electricity reflects the higher costs. Authorities in the US and the UK have recently increased the rates they are prepared to pay to support forthcoming projects.

The group said it plans to lower its 2030 target for installed renewable generating capacity from 50 GW to 35-38 GW. Last month the company said it would exit offshore markets in

Norway, Spain and Portugal. In November it said it was stopping work on two projects off the New Jersey coast of the US after recording DKr28.4 billion (\$4 billion) of impairments

Ørsted also said it will slow down its development of floating offshore wind. Nipper said he now believed floating wind would “advance slower than anticipated” due to high costs and technological challenges.

“We still don’t have mature floating platform concepts,” he said. “I think there are quite a few indicators that, at least at scale, floating will be on a somewhat later time[frame].”

He said, however, that the company was “seeing good signs” that some of the challenges in the offshore wind industry were receding, with installation vessels and factories being built or expanding, which would ease supply chain challenges.

Siemens Energy reports “solid start” to year



Siemens Energy has reported a “solid start” to the year, supported by what it called “continued favourable energy market trends”.

Orders increased year-over-year by 23.9 per cent on a comparable basis (excluding currency translation and portfolio effects) to €15.4 billion.

The group’s revenue came in at €7.6 billion reflecting a 12.6 per cent increase on a comparable basis. While all segments contributed to growth, the increase was particularly strong at Grid Technologies.

Siemens Energy’s profit before special items sharply improved to positive €208 million. Previous year quarter’s

result came in, burdened by quality related charges at Siemens Gamesa, at negative €282 million. The company said the turnaround of its wind business remains the focus.

Christian Bruch, President and Chief Executive Officer of Siemens Energy AG, said: “The solid first quarter is encouraging, in part also due to project shifts, which are normal in plant engineering, especially with the market dynamics we are currently seeing. That is why our focus remains on solving the quality problems in our onshore wind business and making the most of the growth potential for the rest of the company.”

Energy majors outperform expectations

News of strong profits reported by several international oil and gas majors has again drawn criticism from environmental groups.

Presenting its first set of results since replacing Bernard Looney as Chief Executive on a permanent basis in January, BP reported its second biggest annual profit in more than a decade. It recorded underlying profits of \$3 billion in the final three months of 2023, exceeding analyst estimates of \$2.8 billion. This took the group’s earnings for last year to \$13.8 billion.

On the back of this the group said it

would expand its share buyback scheme. The London-listed group announced \$1.75 billion of share buybacks to be completed in the first quarter and committed to return at least 80 per cent of surplus cash flow to shareholders through future buybacks, up from a previous target of 60 per cent. It intends to repurchase at least \$14 billion in stock over the course of 2024 and 2025, it said.

Reacting to the news, Charlie Kronick, Senior Climate Advisor at Greenpeace UK said: “These results may embolden those clamouring for BP to

tear up its green strategy. But the reality is the company is still making billions from fossil fuels and its green policies fall far short of what’s needed to avoid the worst impacts of climate change.

“BP may be the best of a very bad bunch, but we simply cannot leave the future of the planet in the hands of executives and shareholders concerned only with cashing in on fossil fuels until the band stops playing.”

Kronick was also scathing of Equinor, which announced £9.4 billion (\$11.9 billion) in profits.

“These profits make the UK government’s decision to award Equinor almost £3 billion in tax breaks to develop the Rosebank oil field appear even more outrageous,” he said. “That £3 billion could have helped ensure that impacted communities are protected from the worst impacts of the climate crisis or alleviate the strain of sky-high energy bills in the UK.”

Meanwhile Shell’s profits for the last quarter were notably higher than anticipated, with adjusted earnings of \$7.3 billion surpassing the forecast of just over \$6 billion. Despite seeing a

significant 30 per cent reduction in full-year profits, the company still offered a 4 per cent increase in shareholder dividends.

Neil Shah, Executive Director of Content and Strategy at Edison Group, noted however: “In 2023, Shell’s adjusted earnings declined from a record high of nearly \$40 billion in 2022 to \$28.3 billion. This decrease is noteworthy as it marks a departure from the peak performance observed in its 115-year history, primarily driven by the cooling of global oil and gas prices.”

10 | Tenders, Bids & Contracts

Americas

Wood secures offshore maintenance contract

Wood has secured a two-year \$80 million contract extension with Equinor to deliver maintenance and modification solutions to their Peregrino offshore assets, off the coast of Rio de Janeiro, Brazil.

Wood will continue to provide maintenance solutions to optimise the Peregrino wellhead platforms and floating production storage and offloading (FPSO) unit, delivering engineering, prefabrication and outfitting, offshore installation, commissioning and Turnaround (TAR) support.

Shawn Combden, Wood's President of Operations, Americas, said: "This extension reaffirms our client's confidence in our ability to consistently meet and exceed expectations in brownfield engineering project delivery. The maintenance and upgrade modifications delivered by our team will extend the life of these assets, critical to energy security."

AtkinsRéalis wins fusion engineering contract

AtkinsRéalis has been awarded a multidiscipline engineering support services contract by the US Department of Energy's Princeton Plasma Physics Laboratory (PPPL).

The contract has a base period of three years with two optional years and a value of \$50 million.

AtkinsRéalis will support the design of future upgrades to the National Spherical Torus Experiment-Upgraded (NSTX-U), the primary fusion experiment and user facility at PPPL.

Wärtsilä gas engines for New Mexico plant

Wärtsilä has signed a contract with the city of Farmington in New Mexico, USA, to supply the generating equipment for an 18 MW expansion to an existing power plant.

Wärtsilä will supply two 34SG gas-fuelled engines, capable of operating on natural gas, biogas, synthetic methanol, and hydrogen blend. The equipment is scheduled for delivery by January 2025.

The plant will operate on natural gas and will replace lost generating capacity following the closure of a coal fired power plant. It will provide flexible dispatchable power.

Asia-Pacific

800 MW supercritical thermal order for BHEL

Bharat Heavy Electricals Ltd (BHEL) has won an EPC order for a 800 MW ultra-supercritical thermal power plant at Yamunanagar, Haryana, India from Haryana Power Generation.

The 1x800 MW Deenbandhu Chhotu Ram Thermal Power Plant (DCRTPP) will be Haryana's first ultra-supercritical thermal power project. The unit will be located next to the existing 2x300 MW units at Yamunanagar.

BHEL's scope of work includes design, engineering, manufacturing, supply, testing, and commissioning of the steam generator, turbine, and associated auxiliaries and electrical and control instrumentation works.

GE Vernova wins Fukushima wind order

GE Vernova has won a 90 MW wind turbine order from Kadenko Co Ltd, the EPC contractor, for the Abukuma

South Wind Farm project in Japan's Fukushima prefecture.

GE Vernova will deliver 28 units of its 3.2-103 onshore wind turbine and provide long-term full service.

Biomass co-firing for Indonesian coal plant

Valmet will supply a partial bio-conversion for PT Cikarang Litrindo Tbk's coal fired circulating fluidised bed (CFB) boiler in Babelan, Indonesia. Work is scheduled for Q1, 2025.

Sami Sivola, Head of the Environmental Sustainability Team, PT Cikarang Litrindo, said: "This new step will allow up to 25 per cent of the company's total coal consumption to be replaced by biofuel and is in line with the company's commitment to reduce greenhouse gas emissions by 20 per cent by 2030."

Valmet's delivery scope includes the engineering, supply and construction of a new biomass fuel feeding system and the addition of a flue gas recirculation system for the CFB boiler unit 2. The furnace bottom will also be modified to improve coarse material removal from the fluidised bed.

Owner's engineer chosen for Korean wind farm

K2 Management (K2M) has been selected to be Owner's Engineer for the MyeongRyang Offshore Wind project, a venture led by Pacifico Energy Korea (PEK), subsidiary of American renewable energy developer Pacifico Energy.

The MyeongRyang Offshore Wind project is the initial phase of a larger 3.2 GW offshore wind complex off the coast of Jindo-gun, Jeollanam-do in South Korea. The MyeongRyang Offshore Wind project involves the construction of a fixed offshore wind farm with an installed generation capacity of approximately 420 MW. Construction is due to start in 2028.

K2M's role as Owner's Engineer for the MyeongRyang Offshore Wind project encompasses support in overall project management, including wind analysis, meteocean studies, conceptual designs, and preparing and selecting contractors for site investigation. K2M is expected to be actively involved until 2025.

Europe

Hitachi Energy to supply STATCOMs to Germany

Hitachi Energy will supply two Enhanced STATCOM stations with the SVCLight Enhanced grid stabilisation technology to enable TransnetBW to improve power quality in the German transmission grid.

The system will enable dampening of the destabilising effects of renewable energy and expansion of transmission capacity without building new lines. The system integrates efficient reactive power compensation with supercapacitors that absorb and inject active power into the grid. This protects grid stability, reliability, and power quality as the transition to renewable energy accelerates.

Dr Werner Götz, CEO of TransnetBW, said: "The implementation of this solution is another milestone for us in ensuring safe and reliable grid operation in the future."

Italian wind order for Vestas

Vestas has received a 63 MW order for a wind park in Italy. The contract includes the supply and installation of 14 V150-4.5 MW wind turbines, as well as a 10-year Active Output Management 5000 (AOM 5000) service agreement.

Turbine delivery is expected for the first half of 2025 whilst commissioning is planned for the second half of the same year.

Siemens Gamesa wins Polish wind contract

Siemens Gamesa has won a contract from Polenergia and Equinor to supply turbines for the offshore Bałtyk II and Bałtyk III wind farms off the coast of Poland. The projects will have a combined capacity of 1.44 GW.

The two energy companies have signed final contracts for the production, delivery and service of 100 SG 14-236 DD wind turbines.

The contracts with Siemens Gamesa are for the design, supply, installation, and commissioning of 100 offshore wind turbines, as well as their maintenance and warranty service.

In the second phase of the development of the Polish offshore wind sector, Equinor and Polenergia will also implement the Bałtyk I project, an offshore wind farm with a capacity of up to 1560 MW which will be located approximately 80 km from the coast near Łeba.

All three Bałtyk wind farms will have a total capacity of up to 3 GW.

Hornsea 3 offshore export cable installation ordered

Ørsted and Jan De Nul Group have signed the offshore export cable installation contract for the Hornsea 3 offshore wind farm.

Jan De Nul Group will be responsible for the seabed preparation, transport, installation and protection of 350 km of HVDC export cables and platform interlink cable connecting the wind farm to the UK electricity grid.

Hornsea 3 is located 160 km off the Yorkshire coast. When the wind farm comes online, Ørsted's Hornsea trio – comprising Hornsea 1, 2, and 3 – will have a total capacity of in excess of 5 GW, making it the world's largest operating offshore wind zone. The two HVDC export cables and interlink cable will have a combined length of 350 km and connect the wind farm to the national electricity grid.

Cable installation operations are planned to start during 2025, with all works scheduled to be finished by 2027.

P2X Solutions to develop hydrogen plant project

P2X Solutions has been selected to develop a project for the hydrogen production plant planned by Oulun Energia in Oulu, Finland.

The project will include an electrolysis plant with a capacity of up to 100 MW, a carbon capture plant, a hydrogen and carbon dioxide storage as well as a further processing plant whose final product could be methane or methanol.

The investment decision is expected to be made in autumn 2025, and the plant could be operational by 2028.

International

Mitsubishi Power CCGT for Navoi 3

Mitsubishi Power, a division of Mitsubishi Heavy Industries has secured an order from JSC Thermal Power Plants to supply a combined cycle gas turbine (CCGT) system for the 600 MW Navoi 3 project in Uzbekistan. The plant will begin commercial operations in 2026.

The Navoi 3 project will be situated 360 km southwest of Tashkent. The new CCGT will provide not

only electricity, but also industrial steam and district heating.

Mitsubishi Power will oversee the design, procurement, manufacture and commissioning of the core components of the power generation facilities. It will also supply major auxiliary equipment such as air-cooled condensers and gas compressors while Mitsubishi Electric will manufacture the generator for the project.

Bahrain seeks contractors for solar PV park

The Electricity and Water Authority (EWA) of Bahrain is seeking contractors to install a solar PV park of up to 100 MW in the south of the country.

The competitive round will be run until April 3 and will award a project with a capacity of between 90 MW and 100 MW, to be installed in the Al Dur area of Bahrain. Bids are due to be opened on April 4, according to the official tender documents.

Eligible bidders will be considered those who have completed at least two grid-connected solar plants with a minimum capacity of 75 MW each. The winner will develop the project on a turnkey basis and will take care of the engineering, design, procurement, installation, testing and commissioning. The PV park should be switched on within 18 months after the award of the contract.

Fluence awards 870 MW wind/solar service contract

Australia's Atmos Renewables has been contracted by energy storage specialist Fluence Energy to deliver optimisation services to 870 MW of wind and solar assets in Australia.

Atmos Renewables will deploy Fluence Nispera asset performance management (APM) software to optimise the performance of its portfolio, including through loss breakdown analysis and real-time tracking of production losses from grid constraints.

The assets covered by the deal operate in Australia's National Electricity Market (NEM).

Bid for Gayal wind farm due Q2

Enowa, a fully-owned subsidiary of Neom, is expected to award the EPC contract for the 1200 MW Gayal wind farm on a turnkey basis in Q2 2024. The Gayal wind farm is located in Saudi Arabia's Tabuk province.

The scope of work for the EPC contractors includes the design, supply and installation of wind turbine generators and foundations, three 380 kV substations and control systems, meteorological towers, site roads, hard stands, crane pads and associated infrastructure.

The project duration is 31 months from the start date of construction.

L&T Construction wins UAE EPC order

The renewable EPC arm of Larsen & Toubro's Power Transmission & Distribution business has been chosen as the turnkey EPC contractor to build an 1800 MW solar PV plant in Dubai, United Arab Emirates.

The project is the sixth phase of the Mohammed bin Rashid Al Maktoum Solar Park. The project will become operational in three phases. In addition to the PV plant, the scope includes related evacuation and interconnection arrangements including two gas insulated substations, high voltage underground cabling and medium voltage distribution networks.

The solar park is planned to have a total capacity of 5000 MW by 2030.



Hydrogen

European Hydrogen Bank pilot auction hailed a success

The European Union is serious about the energy transition and the use of hydrogen, and to move the new sector forward it has established the European Hydrogen Bank. The bank recently initiated a plan to make funding available to EU companies with set plans to produce hydrogen and encourage its spread as an alternative to fossil fuels.

Gary Lakes

The European Commission announced last month that it has received 132 bids from hydrogen projects in 17 European countries for the pilot auction of the European Hydrogen Bank, a scheme to support renewable hydrogen production in Europe. The total support requested by the bidders far exceeds the available budget of €800 million, provided by the Innovation Fund.

The pilot auction, launched on November 23, 2023, aims to bridge the gap between the cost of producing renewable (green) hydrogen and the market price of fossil (blue/grey) hydrogen, by awarding a fixed premium per kilogram of renewable hydrogen produced to the selected projects. The premium is determined by the bids submitted by the producers, which should reflect the cost gap between renewable and fossil hydrogen.

The lowest bids will be ranked first until the budget is exhausted. The selected projects must start producing renewable hydrogen within five years of signing the grant agreement, the

date for which is scheduled for November this year. The projects will receive the premium for 10 years of operation, starting from the date of production.

"The applications are in and the enthusiastic market response to the pilot auction shows the European hydrogen industry is ready to scale-up!" Kurt Vandenberghe, Director-General for Climate Action said in a statement. "Renewable hydrogen is an important solution in Europe's endeavour to reach climate neutrality by 2050. The success of this pilot auction is the result of thorough engagement and consultation with relevant stakeholders and a solid regulatory framework, which provides certainty to investors. We now have a scheme that provides efficient and targeted public support in full alignment with market needs."

Renewable hydrogen is considered an important solution for decarbonising hard-to-abate sectors, such as industry, transport, and heating.

According to the Commission, all bids taken together provide for a total planned electrolyser capacity of 8.5 GWe. Over the span of 10 years, this

would lead to a total production volume of 8.8 million tonnes of renewable hydrogen. On a yearly basis, this would cover close to 10 per cent of the EU's REPowerEU ambition for domestic renewable hydrogen production in 2030.

Paloma Aba Garrote, Director of the European Climate, Infrastructure and Environment Executive Agency (CINEA), which is responsible for managing the pilot auction, said the strong interest from project promoters "shows that industry is keen to take on the challenge of spearheading the transition from fossil to clean fuels. The successful projects will expand CINEA's portfolio of net zero investments that shape the emerging markets for decarbonised products."

The Commission is also offering a new "auctions-as-a-service" mechanism to enable Member States to benefit from the EU-level platform and award national funding to additional projects, in full respect of State aid rules, the statement said. Germany is the first EU country to make use of the "auctions-as-a-service" feature, putting up €350 million from its national

budget for renewable hydrogen production projects located in Germany in case eligible bids for German projects cannot receive Innovation Fund support due to budget limitations.

CINEA is now checking the admissibility and eligibility of the bids and will then evaluate them, according to the statement. Bids will be ranked according to their price and applicants will be informed about the evaluation results in April or May of this year, when successful applicants will be invited to prepare and sign the Grant Agreements.

"The Grant Agreements will be signed by November 2024 at the latest. The selected projects will have to start producing renewable hydrogen within five years of signing the grant agreement. They will receive the awarded fixed premium subsidy for up to 10 years and only upon certified and verified renewable hydrogen production," the announcement said.

In parallel to finalising the evaluation, the Commission said it will draw the lessons learned from this pilot auction and consult industry stakeholders on the draft Terms & Conditions for the

second round of the hydrogen auction, which it aims to launch before the end of the year.

With an estimated budget of €40 billion from the revenues from the auctioning of allowances under the EU Emissions Trading System between 2020 and 2030 (based on a carbon price of €70/ton CO₂), the Innovation Fund is the EU's largest funding programme for the deployment of innovative net zero technologies.

The European Hydrogen Bank is an initiative to facilitate the EU's domestic production and imports of renewable hydrogen. It aims to unlock private investment in the EU and in third countries by addressing investment challenges, closing the funding gap and connecting future renewable hydrogen supply to consumers, helping to meet the objective of 20 million tonnes of hydrogen in the EU energy mix by 2030. It will also allow the Commission to collect reliable data about the EU's renewable hydrogen project pipeline, the level of competition for this kind of support, the costs of renewable hydrogen production, and its market price.

Gas

Nigeria-Morocco pipeline considers gas supply to West Africa and Europe

The idea of making Nigeria's huge gas reserves available to Europe by pipeline is one that has been around for some time, but which was never really acted upon. Now with natural gas figuring so highly as a key component of the energy transition, the possibility is being given more attention.

Gary Lakes

Proposals to transport Nigerian gas to Europe have previously followed an overland route that would see a pipeline stretching north from Nigeria through Niger and Algeria to the coast of North Africa, but a military coup last year in Niger has put political and economic relations in the region on ice. Russia's invasion of Ukraine and the continuing war there has also impacted Nigeria's desire to boost gas exports with the intension of eventually seizing a piece of the European gas market made available as Europe closes its doors to Russian gas.

Now Nigeria, together with Morocco, is considering the challenge of a major infrastructure project that would run along the entire West African Atlantic coastline. This endeavour, although it would take years to complete, promises to enhance energy security, foster economic cooperation, and strengthen regional ties by the middle of this century.

The proposed pipeline would extend 5660 km from Lagos, Nigeria, where it would connect to the existing West

African Gas Pipeline, and continue its journey northward to Morocco. The route crosses several coastal countries, including Benin, Togo, Ghana, Cote d'Ivoire, Liberia, Sierra Leone, Guinea, Guinea-Bissau, Gambia, Senegal, and Mauritania. Finally, it would reach the Moroccan city of Tangiers, from where it would likely branch off into a spur line to Cadiz, Spain.

The Nigeria-Morocco Gas Pipeline (NMGP) is to have a design capacity of 30 billion cubic metres (bcm) of natural gas per year. This volume could have a significant impact on the energy landscape in West Africa and Europe as it will meet growing demand, provide fuel to industries, and power households.

For the African countries along the route, the NMGP would supply gas that would enhance energy security, contribute to economic growth, provide gas for reliable power generation, strengthen industrial productivity, reduce reliance on other fuels or single sources, increase energy diversification and generally create an environment for economic development in countries that are currently struggling

to advance their energy sectors and economies.

Using natural gas in these countries would likely contribute to their ability to reduce their own greenhouse gas emissions. But according to a feasibility study on the project that began in 2017, work on the NMGP is not expected to begin until 2046 – only four years before nearly the entire globe is committed to reach a point of net zero emissions. Whether the NMGP project will prove advantageous to those it is meant to serve will become more apparent as the years wear on.

Clearly a task as large as this will see numerous challenges, among them Nigeria's offshore industry having the capacity to supply sufficient gas for the project. That means billions in dollars of investment by Nigeria and companies operating in the country. Meeting environmental circumstances, financing, and construction timelines will be essential in getting the project in operation.

The NMGP is estimated to cost as much as \$25 billion – a massive investment near the scale of the Southern Gas Corridor that transports gas from Azerbaijan to Greece and Italy,

but one that could prove to have an equally important impact on the countries and societies that it connects with.

The project is a collaborative effort by the governments of Nigeria and Morocco. The Nigerian National Petroleum Corporation (NNPC) and the Moroccan Office National des Hydrocarbures et des Mines (ONHYM) are the key organisations involved in financing and overseeing the project. Their joint commitment aims to realise the energy infrastructure for the purpose of creating economic growth, regional integration, and sustainable energy supply.

As the state oil company of Nigeria, NNPC is responsible for managing the country's oil and gas resources. Its role is to coordinate with ONHYM on the plan and design of the pipeline and execute the project. It will contribute financial resources and its technical expertise gained as an oil and gas exporter to support the pipeline's development. As the source of the gas, NNPC is to ensure compliance with Nigerian regulations and international standards. It will also engage with the West African states to facilitate

cooperation and approvals.

As Morocco's state-owned hydrocarbon company, ONHYM is responsible for the exploration and development of hydrocarbons in Morocco. Its role in the NMGP required collaboration for joint development and operation of the project with NNPC and making financial contributions that assist with its implementation. It will also ensure project compliance with Moroccan laws and regulations. ONHYM will also assess the environmental impact of the pipeline and negotiate mandatory approvals.

Geopolitical relations between all the countries that the project touches will be vital to its success. Consideration will have to be given to balancing national interests, adhering to cross-border agreements and regulatory frameworks.

Once complete, NMGP will introduce regional energy integration and promote regional self-sufficiency not only with energy but in other economic sectors. And as less coal and oil are used to produce electricity, be it for industry or cars, greenhouse gas emissions will decline, resulting in benefits for the global climate.

An ecosystem approach to mass-market e-mobility

The e-mobility world is an entirely different system from the one that supports ICE vehicles. It requires an ecosystem that depends on widespread and seamless collaboration between multiple actors, enabled by advanced digitalisation. The key to this is a smart and grid-friendly charging infrastructure

Kristian Ruby.

Five years ago, the offer of electric vehicles (EVs) for the mass market was still quite limited. Today, car exhibitions are flooded with new EV models, faster chargers and longer-lasting batteries of different ranges and costs. Pulling out of exhibition venues onto the roads, EV sales have scored records year after year around the globe. Battery production is getting cheaper and the charging infrastructure is starting to pick up the pace. But that's not the full picture.

Globally sales are on the rise but rising more slowly in Europe and the US. So far, demand has been propped up by corporate fleets rather than individuals. Yet, as this market saturates, it will be harder to convince individuals to keep up the pace.

China is leading the race with an EV adoption rate of over 27 per cent – Eurelectric and EY's e-mobility report last year showed – and the US is catching up. Europe has seen two consecutive years of strong growth, reaching 17 per cent in 2021 and just over 20 per cent in 2022, but this must reach 58 per cent in only 6.5 years to meet the 2030 decarbonisation targets – shows our latest 'Power Barometer'.

Electric cars have reached an inflection point. After rapidly making their way into the transport sectors thanks to early adopters and government subsidies, EVs now need to appeal to the mass market, but are the conditions right?

They can be if we take an ecosystem approach that puts the consumer at the centre, strengthens collaboration among all e-mobility actors while benefitting from the right policy incentives.

In Europe, however, the road to mass-market adoption is getting bumpy amid mixed political signals, strong foreign competition and split consumer sentiment.

A recent study from Transport and Environment signals that high upfront costs are still hampering a large section of Europe's population from making the switch, as Western car-makers tend to favour large and more expensive luxury models for EVs.

Our latest study further adds that consumer sentiment is split between early adopters, reluctant buyers and

those mass-market consumers who would like to purchase an electric vehicle but choose not to due to the scarce availability of charging stations, range anxiety and high upfront costs. Yet it is precisely these mass-market customers that EVs must reach if adoption is to accelerate. For this to happen, we must take an ecosystem approach.

The e-mobility world is an entirely different system from the one that supports internal combustion engine (ICE) vehicles. It is an ecosystem that depends on widespread collaboration among multiple actors enabled by advanced digitalisation. These include original equipment manufacturers (OEMs) designing new EV models with different battery ranges; power system operators developing and maintaining a resilient digitalised grid to allow timely customer connections to charging infrastructure; charging point operators (CPO) planning new and smarter charging infrastructure where it is most needed; and e-mobility service providers making sure users have the best charging experience possible across Europe.

The ability to scale highly depends on every player of this ecosystem seamlessly working together. Otherwise, we risk ending up in a situation where the EV uptake will accelerate faster than the ecosystem that can sustain it. The key to resolving this is a smart and grid-friendly charging infrastructure.

By 2030 there will be around 70 million EVs on Europe's roads and 2.8 million public charge points directly connecting to distribution grids. If these chargers are not smartly managed and strategically planned to fit the needs of the power network, unpredictable fluctuations in demand coming from unknown numbers of EV drivers charging simultaneously could lead to voltage deviations and power losses. Upstream, the impact may translate into increased energy prices.

To avoid this outcome, two things must happen simultaneously. First, Europe's grid infrastructure must be expanded to add new capacity and accommodate future connection requests. This can be achieved by adopting a forward-looking planning



Ruby: Eurelectric is ready to support the EV drive

framework for our infrastructure that allows distribution system operators (DSOs) to anticipate power demand and build-out new kilometres of electricity grid through anticipatory investments. At the same time, we must make the best use of existing grid capacity through digitalisation and demand-side response mechanisms. Smart charging is the lowest-hanging fruit in this regard.

As detailed in our 2022 report, smart charging can help manage grid capacity by using algorithms to read grid load and to shift EV charging demand to times when clean and renewable generation is higher and prices are cheaper. By optimising the charging process, smart chargers can reduce charging time, improve battery life, and minimise energy costs. Being completely automated, the charging process only requires the driver to input the desired departure time. The system then adjusts to price signals, grid capacity and the battery's charge.

A McKinsey study on EV integration in Germany concludes that when local EV penetration hits 25 per cent, peak load can grow by 30 per cent in the absence of smart charging. Using a V1G (unidirectional charging) strategy and time-of-use tariffs, the peak load increase can be reduced by 16 per cent. Across different charging segments, smart charging indicates savings of 7-21 per cent peak load. For these benefits to be fully unleashed, however, increased awareness and greater incentives to encourage EV drivers to smart charge wherever possible at off-peak hours and overnight are required.

Taking smart charging one step further is the vehicle-to-grid (V2G) technology. This charging solution allows the bidirectional transfer of electricity from the grid to the vehicle's battery for storage at times of high generation, and back to the grid when demand exceeds supply. With V2G, EV drivers can move from being a passive customer to an active prosumer, who gets compensated for providing not only flexibility, but also the energy, previously stored, back to the grid.

For these technologies to work, however, data must be openly shared across the entire e-mobility ecosystem. Distribution system operators

(DSOs) will need to track real-time behaviour, from the vehicle to the grid and back again. It will enable utility companies to provide information to the market on the state of the grid so that the connected ecosystem can, in turn, steer usage and guarantee reliability for users. And, in doing so, they can transform the influx of EVs from a grid liability to a grid asset.

CPOs can in turn make better use of grid data and heat maps to strategically plan their charging infrastructure build-out and anticipate connection times based on the network status. Yet, today, data is kept in silos, considered as a valuable currency to preserve competitive advantage. Making sure this data is interoperable across the entire value chain should be a clear focus for policymakers as it is for our upcoming report, to be released in the coming days at EVision 2024 (March 6-7) in Brussels.

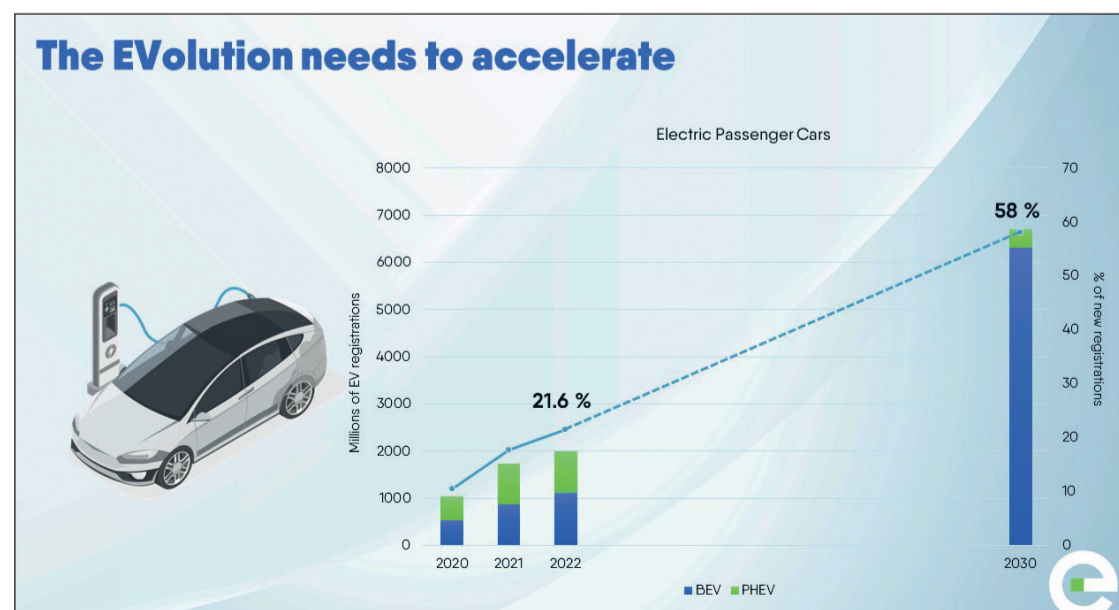
Reaching mass-markets also largely depends on how well Europe is able to engage with corporates. Commercial cars and vans make up 20 per cent of the total EU vehicle park but are responsible for half of all road transport emissions. Their electrification must therefore be a matter of priority to decarbonise transport rapidly as well as making EVs more affordable. Since corporate fleets are usually updated every three to five years, electrifying them can contribute to a more affordable second-hand EVs market for the wider public.

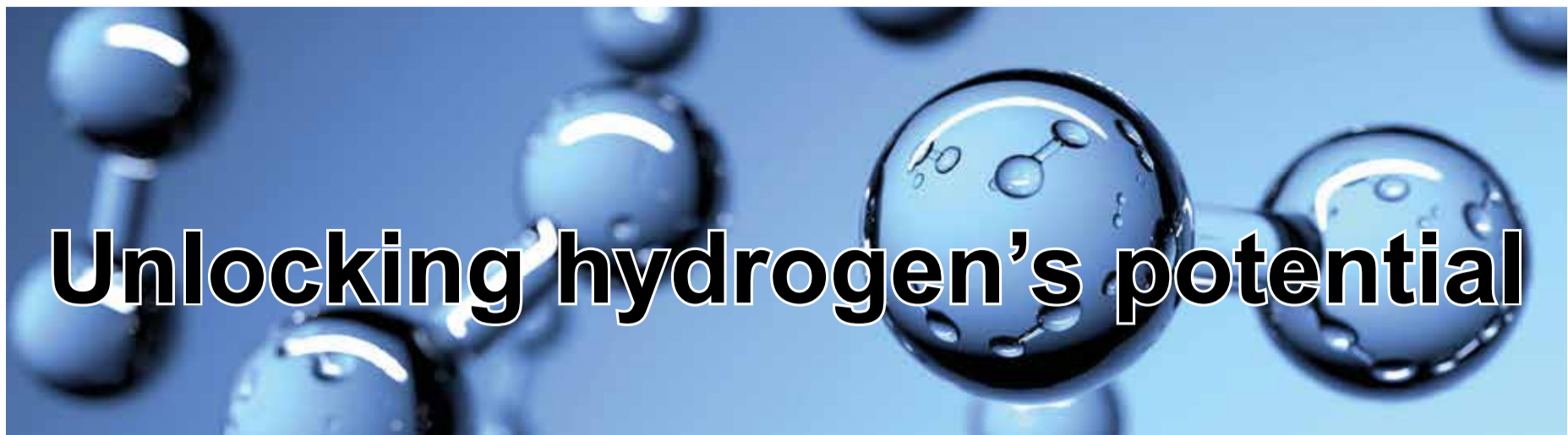
Policymakers can once again make the difference by setting ambitious binding targets for the purchase of zero-emission corporate cars and vans by 2030 through the ongoing Greening Corporate Fleet Initiative and by extending the scope of the initiative to heavy-duty vehicles.

Transforming road transport across the entire continent will of course come with challenges, but with the right policy incentives, interconnected vision and commitment, Europe can meet its ambition for transport decarbonisation, energy security and industrial competitiveness. The electricity industry stands ready to support the drive.

Kristian Ruby is Secretary General at Eurelectric, the federation representing the European electricity industry.

Europe has seen two consecutive years of strong growth but this must reach 58 per cent in only 6.5 years to meet the 2030 decarbonisation targets





Unlocking hydrogen's potential

Due to its versatility, hydrogen has the potential to make a significant contribution to the energy transition. But a re-assessment of capital costs is needed to unlock its potential, argues Ramboll's **Stephen Horrax**.

It may be something of a cliché, albeit a dying cliché, to refer to hydrogen as the 'Swiss Army knife' of future energy solutions but this label does point to the versatility that has been at the heart of hydrogen's appeal across the energy and wider market sectors. That versatility is why hydrogen has the potential to make a significant contribution to the energy transition, particularly to the range of industries that will not be able to benefit from electrification and from low cost green hydrogen production, such as fertilizer production, shipping and aviation.

This potential has been reflected in the huge level of interest into green hydrogen over the last six years. The investment has yet to follow the interest. But this is not seen to be another false dawn for hydrogen. A four-year period between 2018 and 2022 saw huge (evidence based) optimism in the potential of hydrogen to accelerate the energy transition, with investors, industry and governments predicting a vastly expanded market for green hydrogen and its derivatives, made possible by inexpensive renewable electricity, and driven by demand from hard to decarbonise sectors coupled with the potential for high carbon tariffs.

That potential may still be realised, but the optimism looks to have been misplaced when it comes to the alignment of supply and demand, and likely cost and time-

frame. Whilst the former has had the limelight of the hydrogen challenge, it is the latter that has been hiding in the shadows. Supply chain challenges and rising interest rates have seen the levelised cost of energy generation begin to increase for the first-time in decades, whilst hydrogen projects also ran-up against higher than expected costs and delays. That is not a cause for concern in of itself, as many of the technologies being deployed in this space are either still relatively new or yet to be adopted at scale for dedicated hydrogen production. As a result, high capital expenditure (CAPEX) costs are to be expected.

This is not new. We have all seen the graphs of capital costs for solar, wind and batteries in the last 20 years. This was possible because incremental gains were achieved simultaneously across a range of metrics with each new version. As a result, whilst CAPEX costs for electrolyser-based hydrogen production plants may need to decrease by as much as 90 per cent if green hydrogen is to play a significant role in keeping the energy transition on track, past experience suggests that costs can decline by the necessary amount as manufacturing capacity expands.

But as current developments in the market demonstrate, this should not be treated as a certainty. Interest rates may have stopped rising, but they are still high, along with the complexity of supply chains. Once safe assumptions about the availability of abundant cheap, green hydrogen by the end of the decade are being challenged. To address this, industry and government will need to work together closely and, crucially, ensure that the right opportunities to achieve the required level of CAPEX reduction are identified.

In the UK, the government set out its Roadmap for Hydrogen in December of last year. The foundation of this was a £2 billion (\$2.5 billion) commitment over 15 years.

Current revenue support for green (electrolytic) hydrogen production projects comes through the Hydrogen Allocation Rounds (HAR).

The current ambition underpinning the HAR process is for up to 1 GW of capacity to be either under construction or in operation by 2025. By 2030, the stretching ambition is for up to 10 GW of low carbon hydrogen production capacity to be in place (half to be electrolytic), although this is subject to affordability and value for money requirements.

Following the announcement of the HAR1 in December all eyes are focused on the delivery of these 11 projects, but also the submissions for HAR2 at the end of April 2024.

HAR2 is critical to the UK's progress for hydrogen production and also the hydrogen sector as a whole. HAR2 (along with future Rounds) is all about scale – moving from a total capacity of 125 MW in HAR1 to 875 MW, including a minimum hydrogen production capacity of 5 MW.

Through the HAR scheme, the UK government provides subsidy support for projects to balance the difference in costs between low-carbon hydrogen and carbon fuels. The subsidy is contracted over the course of 15 years via the allocation of Hydrogen Production Business Model (HPBM) revenue in addition to initial CAPEX support. In theory, this should 'de-risk' hydrogen projects and encourage the private sector to continue to invest.

However, for this model to function effectively, it is essential that the business plans submitted to the Department of Energy Security and Net Zero (DESNZ) are costed accurately. In response to a consultation after HAR1, an overwhelming majority of respondents identified HPBM as the crucial factor in the development of the electrolytic hydrogen market rather than any CAPEX support. The result is that whilst 70 per cent of applicants expressed an interest in both HPBM and CAPEX support in HAR1, it has been suggested that the need for government support for CAPEX may decrease.

There is no doubt that HPBM support will have a significant role to play in the future of green hydrogen production. After all, if the support offered by the HPBM revenue is not sufficient to help bridge the operating costs gap, progress towards the ambition of 10 GW of production will surely stall.

In terms of the uncertainty of capital costs for hydrogen production infrastructure it is important that the HPBM support does not lead to complacency about the need to ensure that CAPEX costs decrease in the coming years.

It is vital to recognise that CAPEX costs are not only tied to the industry's learning curve and the demand for electrolysers. We fully expect to see a lower costs ally with increased demand to create an ongoing virtuous cycle. But other macroeconomic and geopolitical forces, including commodity prices, the robustness of supply chains, and interest rates, must also be taken into account when forecasting how a project CAPEX will evolve. It should also be recognised that we are currently confronting a lack of data and the cost declines that have so far have been relatively small.

This makes it difficult to predict with any certainty whether the costs associated with electrolysers will

decrease as the industry scales up, or whether they will remain closely tied to outside influences. Consequently, whether cost reductions are taking place must be carefully assessed in order to determine whether the projections of consistently decreasing CAPEX costs are actually feasible.

Going forward, there will be scope to reduce the costs associated with electrolyser stacks, which are the basic building block of electrolysers. Fundamentally, electrolyser stacks are relatively simple products that can be mass-produced and investment is already being deployed to support improvements across the different electrolysis systems being developed, which should bring the CAPEX down. However, constructing entire hydrogen plants is a more complex process and this will limit the impact that lower hydrogen electrolyser stack cost has on the total project CAPEX.

This means that green hydrogen is not likely to be directly comparable with solar power, where the declining cost of photovoltaic modules had a significant effect on wider solar system production costs. If the HARs are to succeed in supporting the 10 GW ambition by 2030, this reality will need to be recognised and support targeted at the areas where significant strides can be made. This does not require a complete change in approach, instead only a shift in focus to identifying the other areas where these advances can be made.

Those advances may be made in addressing the electrolyser system in totality, the electrical equipment involved, or the size of electrolysers, but what is apparent is that these more complex technologies are not currently being addressed by the market. There are also wider issues with green hydrogen plants, including how these are supplied with the water and electricity they require to function, and the best approach to connecting these plants with the wider grid or demand markets.

But it is important to remember that these advances can be made and by focusing on the right areas, there is every reason to believe the necessary CAPEX cost reductions can also be achieved. That will enable us to unlock the huge upside that green hydrogen production offers for the energy transition.

The key now is for industry in its broadest sense and government to set about addressing those challenges as quickly as possible and ensure the roadmap is realised.

Stephen Horrax is the Head of Department, Energy Transition UK, at Ramboll.

Horrax: There is every reason to believe the necessary CAPEX cost reductions can be achieved



UK: an attractive destination for clean energy investment

Britain needs to raise its objectives if it wants to comply with its international climate commitments. This should bode well for the number of clean energy investment opportunities around the country. In this first in a series of country analyses, *TEI Times* looks at the country's generation and consumption profiles, policy, emissions targets and ability to attract the investment needed to meet its targets.

Over the past few years the UK has managed to attract sizable amounts of investments into its clean energy sector. The country remains attractive to foreign direct investors who are likely to find appealing the large number of new projects the country will need to meet its global net zero commitments.

Commitments

The national decarbonisation pledges of the world's sixth largest economy are no longer linked to those of the EU, a leader in the field. Yet, its commitments rank highly when studying its emissions reduction and renewable

ample, estimated that the nation would be between 4 and 15 percentage points short of its 68 per cent below the 1990 level by 2030. It seems likely that over the next few years, Britain's objectives will be raised as it wants to comply with its international commitments and seeks to regain a top clean energy leadership role. This should bode well for the number of clean energy investment opportunities around the country.

Energy profile

The profiles of the UK's electricity generation and primary energy consumption by fuel are quite different.

adopts mid-of-the-way fossil fuel price changes and economic growth assumptions. There will be no contribution from coal or oil, well before the end of the 2020s. Electricity from natural gas will account for less than 8 per cent of the total from 2030, compared to about a third in 2020.

Clean energy projects all over the country abound. The government's Renewable Energy Planning Database lists almost all projects at different stages, including inception, planning, construction, and operation. A brief examination of the list shows there are over 10 000 projects ranging from a few hundred kilowatts to sev-

profile, Britain should be able to attract the necessary amounts.

The challenge in investing in clean energy projects is down to policy and regulation. The UK has been using a Contract-for-Difference scheme (CfD) which has generally worked well and has been viewed as positive by investors until recently. There are now some stumbling blocks with CfD which the current, or a new government, must address in the near-term.

The CfD, established ten years ago, is a contractual mechanism aimed at incentivising and de-risking investments in clean energy projects at the least cost to consumers. The devel-

	Index/Rank/Rating	Year	Source
Business			
Moody's sovereign credit rating	Aa3 stable	2023	tradingeconomics.com/
S&P sovereign credit rating	AA stable	2023	tradingeconomics.com/
Global Innovation Index	4/132	2023	wipo.int/global_innovation_index/
World Bank Ease of Doing Business Index	8/190	2019	archive.doingbusiness.org/en/rankings
Other			
Global Corruption Perceptions Index	20/180	2023	transparency.org/
Reporters Without Borders Press Freedom Index	26/180	2023	rsf.org/en/index
World Justice Project Rule of Law Index	15/142	2023	worldjusticeproject.org/rule-of-law-index/

UK investment profile for foreign investors

energy goals. The UK last updated its climate targets to the United Nations in September 2022. It aims at decreasing all greenhouse gas emissions, not just carbon dioxide, to 68 per cent below the 1990 level by 2030, and 100 per cent below by 2050. The government's ambition is to aggressively deploy more renewables, hoping to have 100 per cent clean electricity available supply by 2035; goals which were stated in the 2021 Net Zero Strategy document and updated in the 2023 Carbon Budget Delivery Plan.

Some have criticised the commitments as insufficient and lacking clarity. Friends of the Earth, for ex-

About 75 per cent of electricity output was from non-fossil fuels whereas only 25 per cent of primary consumption comes from clean resources, based on data from 2022.

Electricity from clean energy sources, including nuclear, is projected to account for more than 80 per cent of the total, from about 2027 or so onwards, reaching 310 TWh by 2040. This is a massive increase relative to 50 per cent in 2017 and less than 20 per cent in 2007. The reference assumptions for electricity-by-source forecasts by the Department for Energy Security and Net Zero

eral gigawatts. They cover a wide range of technologies, such as anaerobic digestion, biomass, offshore wind, pumped storage, and tidal stream. As the nation continues to lag behind its goals, an acceleration in the number of new projects is likely in the next few years.

Investment environment

The UK is widely regarded as an attractive foreign direct investment destination. The nation's credit rating is well into the investment grade bracket, recovering from slightly lower levels in recent years. Credit agency Moody's rating is Aa3, the fourth highest, while the ranking by S&P is AA, its third highest level. Britain scores well on other global business-related indexes including ranking fourth in the Global Innovation Index and eighth in the World Bank Ease of Doing Business Index. It also does well in other areas of interest to foreign investors, namely 20th on the Corruption Perceptions Index, 15th on the Rule of Law Index, and 26th on the Press Freedom Index; the lower the better in the case of all three indexes.

Investment policy

There are a variety of estimates as to the investment amount that the country will need up to 2050 to decarbonise the economy. Investment advisory firm Lane Clark & Peacock in 2021 projected about £12 billion (\$15 billion) per year would be spent on a variety of clean energy technologies and infrastructure. International accounting firm, PwC, put the annual figure at £40 billion. Given the large amount of capital attracted to decarbonisation-related investments and given the UK's appealing investment

oper is protected from volatile electricity prices through entering into a contract with the Low Carbon Contracts Company (LCCC), a government-owned company. Specifically, the price obtained is for 15 years and is indexed; "the difference between the 'strike price' (a price for electricity reflecting the cost of investing in a particular low carbon technology) and the 'reference price' (a measure of the average [UK market price])".

The scheme has become less attractive today, with investors arguing that the strike price is too low. The government is likely to execute some changes so as to regain interest and competition in the scheme as it is quite aware of the current challenges.

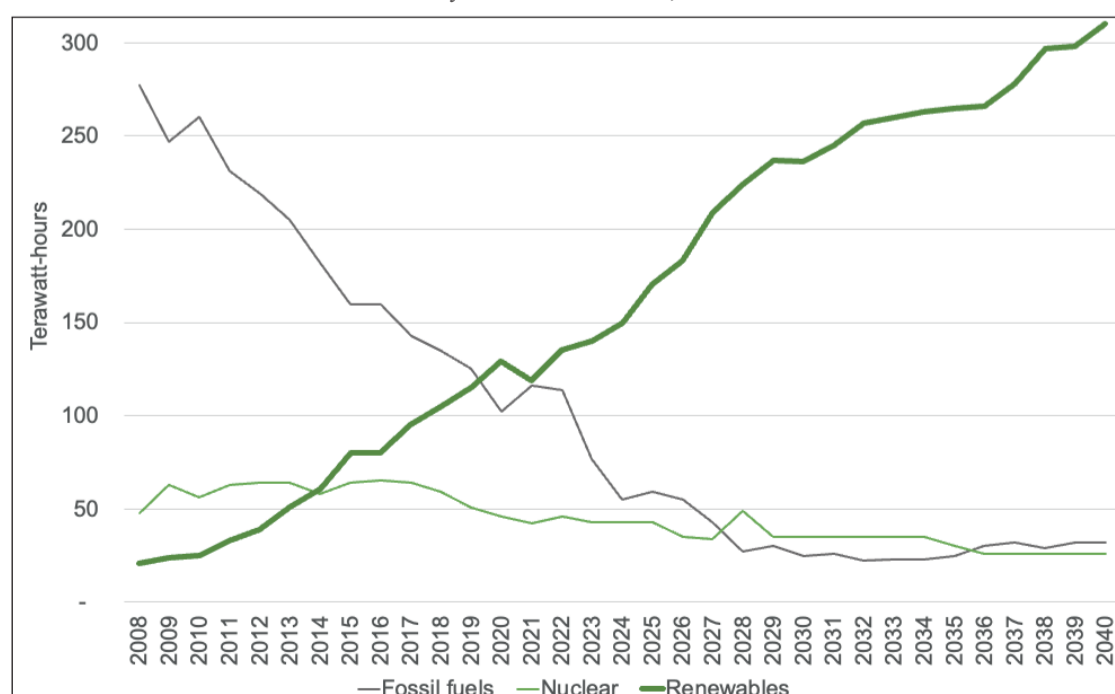
There are also other challenges such as the speed of approval of projects, local clearance hurdles, and limited grid connection. These are challenges that the government is likely to address in the near-term.

Investors

The profile of investors in UK clean energy projects is quite varied, as it is in most attractive markets. Typically for larger projects, investors form consortiums. The investment in the £8.27 billion 3.6 GW Dogger Bank offshore wind project, whose first turbine was commissioned in October 2023, was started by three-parties SSE Renewables (40 per cent), Equinor (40 per cent) and Vårgrønn (20 per cent). Consortiums are not limited to the developers of the project. Commercial lenders also often establish consortiums so as to diversify lending portfolio risk.

Prepared for *The Energy Industry Times* by Joseph Jacobelli at aCTEi.

UK electricity output generation by source



AI: maintaining balance in the transition

Industrial facilities can play a critical role as balance service providers in the Nordic energy reserve market. A new installation at an industrial park in Finland is showing how the use of artificial intelligence can help balance the grid, while presenting a commercial opportunity for the asset owner. Exaum's Henri Yoki explains.

The AI-driven grid optimisation pilot system at Karhulan has been operating since November 2023



The importance of maintaining the intricate balance in an electric grid that is experiencing a growing influx of variable renewables is widely understood. Fewer, however, grasp the opportunity found in maintaining equilibrium in the power supply-demand dynamic, especially in a world where there is often overcapacity because of the growing reliance on unpredictable sources such as wind and solar. While blackouts or brownouts are relatively unknown in the Nordic countries, generators, industrial consumers and grid operator are seizing the opportunity presented by the growing need for improved grid management in the green transition.

In a move to support players in the evolving energy market, Finnish technology company, Exaum Ltd, has launched an innovative pilot project in Finland that uses artificial intelligence (AI) to allow an industrial facility to offer optimised grid balancing. The 1 MW pilot project at the Karhulan Industrial Park, 130 km east of Helsinki, is the latest step in helping the facility scale-up its heat-generation-based power demand response technology.

Launched in November of 2023, this first-of-its-kind system aims to help facilitate the green energy transition by providing near-instantaneous grid balancing of power as more wind, solar, and other green but unpredictable sources, are added to the transmission system operator's supply choices.

The pilot aims to show the benefits that AI can bring compared with existing options.

Presently, the prevailing approach to grid balancing predominantly revolves around energy storage solutions, with a notable emphasis on

building-centric strategies. A good example of this is the recent €17.7 billion EU subsidy to Italy to build a massive, centralised battery energy storage system (BESS).

Energy professionals often focus on bolstering storage capacities within individual structures, viewing this as the primary solution for addressing fluctuations in supply and demand. However, this fixation overlooks the potential of harnessing new consumption-based assets, which warrant greater attention and investment in the context of grid balancing.

Consumption-based assets represent a diverse array of demand-side resources and technologies that will play a significant role in grid-balancing efforts. These assets include demand response programmes, energy-efficient appliances, electric vehicles, and smart thermostats, among others. By optimising energy consumption patterns and leveraging demand response capabilities, consumption-based assets are key to contributing significantly to grid stability and reliability.

In addition to energy storage and consumption-based assets, grid balancing efforts can also benefit from investments in grid infrastructure and transmission technologies. Transmission technologies, such as high-voltage direct current (HVDC) grid interconnections, can enable the efficient utilisation of renewable resources located in remote areas, thus, balancing weather dependent generation and consumption between regions.

In navigating the intricate terrain of grid balancing, it becomes evident that three distinct categories of operators are primed to assume pivotal roles in this dynamic arena.

Firstly, there are the pure digital players, whose hallmark lies in their unwavering dedication to asset optimisation through the deployment of advanced analytics and algorithmic solutions. These forward-thinking entities capitalise on the power of data-driven insights to unlock unprecedented levels of efficiency within existing infrastructure. By harnessing the vast troves of data at their disposal, they fine-tune operational processes, identify optimisation opportunities, and proactively address potential vulnerabilities, all of which collectively serve to fortify the resilience of the grid. Through their innovative approach to asset management, these digital pioneers not only enhance grid stability but also pave the way for a more agile and responsive energy ecosystem.

Secondly, battery energy companies emerge as crucial players in the pursuit of grid stability. Leveraging state-of-the-art battery technologies, these firms provide scalable storage solutions capable of efficiently storing surplus energy during periods of abundance and discharging it during times of scarcity. Their role in grid balancing is paramount, serving as linchpins in fortifying the reliability of integrating renewable energy sources. However, it is important to recognise that the battery business operates fundamentally as an arbitrage business, focused on buying low and selling high. Each cycle requires generating sufficient returns



Yoki: it is imperative to recalibrate our focus on grid balancing

to cover the levelised cost and generate profits to eventually recoup the initial capital expenditures.

Consequently, while batteries are often perceived as a panacea for grid balance issues, their business model, largely due to the significant capital expenditures required, may not align perfectly with the objectives of high-voltage transmission system operators seeking to balance the grid.

Lastly, virtual power plant (VPP) aggregators exemplify the fusion of digital innovation and energy management. By consolidating diverse energy resources, including distributed generation units and demand response mechanisms, these entities wield collective power to optimise grid performance. Through dynamic orchestration and real-time monitoring, virtual power plants emerge as invaluable allies in the pursuit of grid resilience and sustainability.

Virtual aggregation, while not a novel concept, has gained considerable traction in recent years. For instance, Entelios, founded in 2013 in Germany, was among the pioneering companies in Europe to adopt this approach. Presently, there is a surge of interest in VPP aggregators emanating from various niches, encompassing both consumer and industrial players. However, a notable challenge arises from the fact that many aggregators lack direct access to the transmission system operator reserve balance markets, necessitating reliance on intermediaries. Consequently, the owners of the underlying assets may experience diminishing returns as a result of this intermediary involvement, posing a potential hurdle to the widespread adoption of virtual aggregation solutions.

The advanced technology in Exaum's solution's main application is using AI neuro-networks for time-series forecasting. Exaum is basically using AI to predict the future. The system is fed model time-series parameters and then the AI formulates what the market will be tomorrow. Understanding the future market helps the system make better-informed decisions on how to run balancing capacity assets.

The company's business model is also a benefit to transmission system operators like Fingrid, the TSO in Finland. Fingrid's benefit is that as there are more balance service providers in the markets, and thus more power consumption capacity offered, they will benefit from lower procurement prices. The economic model in brief is that the price of electricity is driven by three factors: energy price, cost of transmission, and taxes. The

cost of balancing the electric grids is inside the transmission cost. As Exaum's business model will help to cut down the cost of balancing, it has an effect on the cost of electricity in the form of keeping and lowering the cost of transmission.

Exaum is on track to expand its grid balancing facilities in Europe, aiming to have at least 100 MW in operation within the next year and to grow rapidly in the coming years to meet the International Energy Agency's projected 500 GW of balancing capacity needed by 2030. With its proprietary software-hardware combination in the Karhulan facility, the company has proven a profitable business model that can now scale. Karhulan is currently selling all of its available capacity to the balancing market.

As it scales, Exaum aims to complete Nordic and Baltic pilots while scaling the solution. The next step is to install more systems at heat generation-focused industrial facilities.

In charting the course towards a greener, more resilient energy landscape, it is imperative to recalibrate our focus on grid balancing. We currently rely upon adding controlled amounts of fuel to burn our way to capacity, but this changes with renewables where overcapacity is the norm because of unpredictability. While energy storage remains a crucial component of this endeavour, its efficacy is magnified when complemented by investments in consumption-based assets, grid infrastructure, and transmission technologies. By embracing a holistic approach to grid management and leveraging the expertise of diverse stakeholders, we can navigate the complexities of the energy transition with confidence and foresight.

In conclusion, the transition to green energy signals a profound paradigm shift in the energy sector, emphasising the critical importance of grid balancing. As we endeavour to unlock the vast potential of renewable resources, it is imperative that we prioritise the development of electricity-consumption-based assets that embody key attributes: cleanliness, availability, flexibility, and affordability.

In realising this vision, let us embrace the opportunity to pioneer transformative solutions that not only propel us toward a cleaner, more sustainable energy landscape but also foster economic growth and social progress.

Henri Yoki is Founder and CEO, Exaum Ltd. henri@exaum.com



Junior Isles

Mind the gap

The UK may be small in terms of geographic size but has long been viewed as being among the world leaders in many fields of science and technology – including energy and electricity. It is no wonder then that DNV singles out the UK as a focus for one of its ‘Energy Transition Outlook’ (ETO) reports.

As a pioneer in energy market liberalisation and a forerunner in the rapid phase-out of coal fired generation, while becoming the world leader in offshore wind power, DNV’s spotlight on the country in the context of the climate change challenge, is justified.

In its ‘Global ETO’ report published late last year, DNV forecast that any possibility of limiting global warming to 1.5°C will be gone by 2030 and the likelihood of staying within 2°C will be hanging by a thread in 2050.

DNV’s UK report, published late last month, shed some light on how the UK is faring in that global effort.

Notably, DNV’s forecasts are not several scenarios. Instead the company opts for a single forecast that gives the most likely development of the energy system as a function of technology trends, costs, energy demand and policies. The modelling is based on four pillars: energy demand, supply, infrastructure and cost – in terms of investment and to the consumer.

Launching the ‘ETO UK 2024’ report, its author, Frank Ketalaars, said: “We need to see the UK as an integrated part of the global energy system because we are linked to the global systems through things like technology trends, economic parameters and availability of resources.”

The findings were interesting. Firstly – even when factoring in both population and GDP growth – the report sees a 25 per cent decrease in demand by 2050, “very much linked to energy efficiency improvements”.

In terms of energy supply, Ketalaars noted that the transition away from fossil fuels “will be very slow”. The report forecasts that more than a third

(35 per cent) of primary energy supply will still come from fossil fuels (oil and gas) in 2050.

He explained: “In transport, we don’t see the penetration of low-carbon fuels, especially for heavy transport and aviation. Also, we see that more than 60 per cent of homes in the UK will still be using natural gas for heating.”

The good news, however, is the increasing use of electricity across all sectors. According to DNV, today 75 per cent of all energy demand is delivered in the form of fossil fuels. By 2050, it sees a significant shift. The use of electricity in meeting overall energy demand will go from 15 per cent today, to 50 per cent in 2050. This will be due to the large-scale electrification of transport and the partial electrification of heat in homes, i.e. through heat pumps.

“The good side, and driver of the energy transition, is electrification,” said Ketalaars. “We forecast a 2.3 times increase in electricity generating capacity between now and 2050. And we also see electricity ‘greening’ very fast. We will actually be able to achieve a decarbonised electricity generation system in 2035 – including the effect of about 10 million tonnes/year of carbon capture capacity to decarbonise the bits of fossil fuel we are still using.”

As expected, variable renewables will dominate the electricity landscape. As electricity demand between now and 2050 increases by 130 per cent, three quarters of power generation will come from renewable sources.

Ketalaars said: “There will be some stable baseload supply from bio-energy and nuclear. But the main source of generation today, which is gas turbine-driven, is reducing quickly and will be less than 5 per cent of electricity generation. And at that time, most of those gas turbines will probably either have carbon capture or use hydrogen as a fuel to minimise emissions. Also, those units will be very much back-up

units to provide power when there is less wind and solar.”

But is all of this enough? The general consensus is no. The report finds that the UK is not on track to meet either its legally-binding ‘Net zero by 2050’ target or its commitments for 2030 under the Paris Agreement.

Ketalaars said that although the UK has made “very good progress”, cutting carbon emissions by 50 per cent compared to 1990 levels, it will begin significantly missing its five-yearly carbon budget targets after 2032.

DNV’s forecast shows that the UK’s annual emissions will amount to some 125 MtCO₂e in 2050. That implies a significant 85 per cent reduction relative to 1990 levels, but not the 100 per cent reduction by 2050, which the UK legislated for in 2019. Similarly, the UK will also not meet its Nationally Determined Commitment (NDC) of reducing emissions by 68 per cent by 2030 compared with 1990. It expects an emissions reduction of around 55 per cent by then relative to 1990 levels.

Commenting on the report during a panel discussion at the launch, Owen Bellamy, Team Leader, Energy Supply at the Climate Change Committee, said: “It’s really interesting to see that DNV’s assessment is roughly in the ballpark of where we thought we’d get to by then. They both show we need to do more to get back on track to get ourselves on the way to net zero.”

In summarising the report, Ketalaars stressed several things the UK should focus on in the short-term to get back on track. These include kick-starting the hydrogen economy, increasing carbon capture capacity and taking a “whole system view” across the energy system. But number one on the list is policy.

“It’s very clear that stronger and also long-term policy support is needed for key transition technologies. If we simply leave it to market forces, technologies don’t develop fast,” he said. “So we feel there has to be continued support specifically on things

like building offshore wind, which is such a big part of new generating capacity, especially floating offshore wind.”

If policy is the number one driver, however, the UK could be in trouble. Polls show the current Conservative government is likely to be replaced by a Labour government at the next election. Labour’s recent U-turn on its green agenda is therefore of grave concern. Earlier last month, it announced that it will row back on its £28 billion green investment plans, blaming worsening public finances under the Conservative government.

In his foreword to ‘ETO UK 2024’, Hari Vamadevan, Regional Director, UK & Ireland, Energy Systems DNV likened the UK’s emissions gap to that familiar London underground announcement: “Mind the gap”.

He wrote: “London Underground (the tube) launched its ‘Mind the Gap’ safety campaign more than 50 years ago, and that call to action has become second nature for my fellow Londoners. I think we need to elevate the message to ‘Mind the Gap to Net zero’. The gap in question is between the Nationally Determined Contributions (NDCs) of many nations, including the UK, and the 2050 net zero ambitions they are pursuing through their current emission reduction plans.”

He noted the shortfall in renewable projects compared with the amount of gigawatts needed, as well as the increasing gap in the required levels of skills and supply chain requirements. But added: “Fundamentally, there is a gap between targets and the policy needed to drive industry to scale.”

If Labour does win the next election and follows through with diluting its green ambitions, that gap will only widen. By 2050 or sooner the gap between the days when the UK could credibly hold itself up as an example for the world and the reality, will be a lot wider than that on the platform of the London Underground.

