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Special Technology Supplement

A steely resolve to cutting carbon emissions.

Accelerating electrification

A flexible, forward-thinking approach must be taken to accommodate the UK's unprecedented soar in demand for renewable electricity. *Page 13*

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Oman plans to add 4 GW of renewables by 2029

Nama Power and Water Procurement Co (PWP), the sole offtaker of electricity from independent power plants in Oman, is to solicit about 3 GW of new solar and wind power capacity from developers by 2029 in addition to 1 GW that has already been awarded. *Page 9*

Technology Focus: Powering the future with Prussian White

Amid the global shift towards sustainable energy solutions, Swedish sodium-ion battery developer Altris has developed a pure Prussian White cathode material with a capacity of 160 mAh/g – making it the highest capacity declared to date. *Page 15*

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Europe plays catch-up with US on clean tech investment

Energy UK's Emma Pinchbeck says the IRA has been "a game changer"

The US Inflation Reduction Act has seen various economies around the globe introduce their own incentives for attracting clean tech investment. Two recent reports find that the EU and the UK are falling behind the US and risk losing their leadership position. **Junior Isles**

On the first anniversary of the USA's Inflation Reduction Act (IRA), a new report has highlighted the impact of what the US and other major economies are doing to attract investment in clean technologies.

'Funding The Future' – the latest report in Energy UK's Clean Growth Gap series produced in partnership with Oxford Economics – details measures introduced recently by the United States and the European Union, as well as other countries like China, Japan and India, in order to incentivise investment in clean energy.

Although many of the IRA's provisions only became effective at the start of the year, early indicators featured in the report point to the impact these are already having. Funding announced for new factories in the automotive and battery sectors since the IRA was passed is more than 20 times higher than it was in 2021 while share prices for US-based companies specialising in low-carbon technology have also been boosted.

The IRA has a total budget of $369 billion for the period 2023-2031 with the majority of this funding in the form of tax credits to reward private investment in clean technology, transport and manufacturing.

The EU responded to the IRA with its Green Deal Industrial Plan (albeit with a wider scope than the IRA) incorporating funding from two existing programmes – Repower EU (€270 billion) and the Recovery and Resilience Fund (€250 billion) – with support also available through other initiatives, along with the relaxation of State Aid rules and other regulatory requirements.

The report also details how China, whose $546 billion spend amounted to near half of the world's clean technology investments in 2022, has unveiled a $72.3 billion packages of tax breaks for electric vehicles. Japan already has a $18 billion Green Innovation Fund in place and aims to realise $1 trillion in public-private investment to finance its green transition over the next 10 years. Meanwhile, the Indian government has this year promised to make $4.3 billion in investments towards its own transition.

The report was launched as the UK, a leader in offshore wind, attempts to form its own response to the IRA and other global incentives to attract clean energy investments.

Energy UK's Chief Executive Emma Pinchbeck said: "The IRA has been a game changer for the investment landscape and as this report shows, other key markets are already responding… With growing global competition for private investment that can choose its location, a failure to respond will quickly see us fall behind and jeopardise ambitious targets for increasing our own sources of clean energy and decarbonising our whole economy."

Meanwhile, figures from industry body Cleantech for Europe show the EU has fallen behind the US in funding for early-stage clean technologies, with a total of $8.7 billion worth of investment going towards start-ups in areas such as carbon storage, electric vehicles and clean power in the year since the IRA came into force.

By contrast, more than $21.7 billion has been committed to similar projects in the US, although the EU pulled ahead in energy and transport investments in the second quarter of this year.

The difference was most pronounced for clean hydrogen, Cleantech for Europe said. Venture capital investments in clean hydrogen projects reached a high of €343 million in the EU in the first quarter of 2022, almost three times the equivalent funding in the

Continued on Page 2

G20 fails to make progress on climate talks

The Group of 20 (G20) major nations have again failed to agree on concrete targets to cut dangerous greenhouse gas emissions.

At the end of a meeting in Chennai, India, in late July, environment and climate ministers could only manage to release a statement that dismissed current measures to address climate change as "insufficient".

Following three days of meetings, organisers released a document showing the bloc remained divided on calls led by developed nations for the emission of greenhouse gases to peak by 2025 and reduce and fall by 60 per cent by 2035 over 2019 levels.

Members could not agree on depleting carbon budgets, historical emissions, net zero goals and the issue of financing to support developing countries, the document showed.

The failure to reach an agreement came just a week after the G20 major economies' disagreement in Goa on phasing down fossil fuels, following objections by some major fossil fuel producer nations.

The Chennai meeting had been seen as a chance for the world's biggest polluters to take concrete steps ahead of a G20 leaders' meeting in September in New Delhi and the COP28 Summit in the United Arab Emirates in December.

Developed countries in the group had demanded mitigation of greenhouse gas emissions to limit global warming to 1.5°C, an Indian official said.

The demands were opposed by developing countries who said the mitigation targets – aimed at cutting or eliminating greenhouse gas emissions, or removing them from the atmosphere – would limit their ability to develop infrastructure and grow, the official said.

China and oil-rich Saudi Arabia backed away from making commitments in the G20 talks, members of a European delegation said but China rejected that.

China's foreign ministry said in a statement it "regrets" the failure to reach an agreement at the meetings, which was caused by "geopolitical issues" brought up by other countries "for no reason".

It also said the G20 should build political consensus among members and "fully respect the different development stages and national conditions of countries".

China is maintaining its stance despite experiencing its own share of extreme weather. Parts of the country, including its capital, were battered at the start of August by the heaviest rain in 140 years, the Beijing Meteorological Service said. The floods were another example of the extreme weather being experienced around the world, which has included wildfires, that has raised fears about the pace of global warming.

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US. But in every quarter since, investments in green hydrogen in the US have outpaced those in the EU, with the US investing €1.2 billion more in total over the period.

Washington is offering tax credits of up to $3 per kilogramme of clean hydrogen depending on production conditions.

Markus Krebber, Chief Executive of the German energy group RWE, said at a press conference last month that the US was "doing more at the moment to build up integrated value chains", adding that Europe "could step up its game".

The European Commission announced its Net Zero Industry Act (NZIA) in March, setting targets for domestic manufacturing capacity for green technologies such as solar power and batteries. But changes to EU state aid rules have raised concern that big economies such as Germany and France will spend more and unbalance competition within the bloc.

Giles Dickson, Chief Executive of industry organisation Wind Europe, said governments were being "slow across the board" to take advantage of the new state aid rules.

This could see the region falling short on targets for technologies such as offshore wind, a sector that is already being challenged by global supply chain issues.

According to the latest Horizons report by Wood Mackenzie, a global insight business for renewables, energy and natural resources, the global offshore wind supply chain will require $27 billion of secured investment by 2026 if it is to meet a five-fold growth in annual installations (excluding China) by 2030.

Dickson says governments are being slow to take advantage of the new state aid rules

This figure is based on Wood Mackenzie's base case outlook which forecasts annual capacity additions to hit 30 GW by 2030, but is dwarfed by policymakers' offshore wind targets, which would require nearly 80 GW per year. To hit this goal set by governments across the world, the supply chain is estimated to require more than $100 billion in investment.

The findings come from: 'Cross currents: Charting a sustainable course for offshore wind', Wood Mackenzie's analysis into current offshore wind supply chain constraints, investment barriers and what is required to scale up.

"Governments have made clear their commitment to offshore wind as an important pillar of decarbonisation and energy security. However, the supply chain is struggling to scale up and will be an impediment to achieving decarbonisation targets if change does not happen," said Chris Seiple, Vice Chair, Power and Renewables at Wood Mackenzie, co-author of the report.

France and Germany must compromise on nuclear to advance market reform, says E.On

France and Germany must find a compromise to end ongoing delays to the much-needed revision of Europe's electricity market, according to one of Europe's largest utilities.

Leonhard Birnbaum, Chief Executive of German energy company E.On, says Berlin should accept differences of opinion and stop trying to impose its views on nuclear power on the rest of the EU in order to break the deadlock on electricity market reform.

Germany shut down its last three nuclear power plants earlier this year following its pledge to end its use following the Fukushima meltdown. France, meanwhile, has made it a priority to maintain and modernise its nuclear power plant fleet, especially after Russia's invasion of Ukraine.

A major stumbling block is Germany's refusal to support France's proposal to allow governments to provide state aid to existing power plants, which could enable Paris to support the French nuclear fleet.

Birnbaum said it would be "better for everyone" if the two countries could approach the dispute with the mindset that "everyone does their part".

He said: "Neither the French will be able to persuade us to use nuclear power, nor we will be able to persuade them not to. That's why I think we should take a different approach to the discussion." Birnbaum added Germany "would do well to be a bit cautious about trying to impose our way on everyone else", warning that this approach was unlikely to be "crowned with success".

Birnbaum, whose company owned one of the three German nuclear plants shut down this year, noted that French nuclear energy was helping Germany's transition to renewables. Germany has been a net importer of French electricity since shutting down its own nuclear plants, which prompted the French Energy Minister Agnès Pannier-Runacher to accuse Berlin of hypocrisy.

"It's a contradiction to massively import French nuclear energy while rejecting every piece of EU legislation that recognises the value of nuclear as a low-carbon energy source," Pannier-Runacher told the German business daily *Handelsblatt*.

She also criticised Berlin's drive to use new gas fired power plants as a "bridge" to its target of being carbon neutral by 2045, arguing that it created a "credibility problem" for Germany: "Gas is a fossil fuel."

German government officials responded by pointing out that Germany was a net exporter of electricity to France over the winter when its nuclear power stations were struggling to produce because of maintenance problems.

They added that the country only imported French power because it was cheaper, not because their country was suffering shortages.

Paris is also wary that Berlin's stance is an attempt to undercut a key aspect of French industrial competitiveness.

German industry has itself struggled with high energy prices, resulting in a call for the government to subsidise industrial electricity prices.

Last month, predictions that the government would spend less than half the €83 billion earmarked for subsidising energy prices sparked a dispute on how the savings should be spent.

The Munich-based Ifo Institute estimated the "gas price brake" that German Chancellor Olaf Scholz unveiled last year, as part of a €200 billion plan to cushion the impact of the country's energy crisis on households and small businesses, would cost about €13.1 billion due to lower gas prices – only a third of the €40 billion set aside for it this year.

The government is also on track to make similar savings on the €43 billion it had budgeted to subsidise electricity bills, with the policy set to now cost around half that amount based on energy futures prices, according to Max Lay, an Ifo specialist who conducted its latest study.

"Some politicians say 'we have this funding, so let's use it', for instance on the industrial electricity price subsidy, but I'm not sure this will go through," said Lay.

Economy Minister Robert Habeck, one of the leaders of the Green Party, is pushing to use the savings for a subsidy on industrial electricity prices. But he is facing opposition from fiscally conservative Finance Minister Christian Lindner, head of the liberal FDP, who would rather use the money to reduce Germany's budget deficit.

Commission says hydrogen "essential" for EU decarbonisation,

Hydrogen is one of the two pillars, alongside renewable energy, for complete decarbonisation, according to a new study prepared by the Fraunhofer Institute for Systems and Innovation Research and Artelys on behalf of the European Commission.

The study, entitled 'The Impact of Industry Transition on a CO_2-Neutral European Energy System', provides a comprehensive view of the energy transition in Europe, with a focus on the decarbonisation of industry. It says a reduction in CO_2 emissions by up to 95 per cent is possible by 2050, but only with increased use of hydrogen in combination with massive development of renewable energy sources.

Jorgo Chatzimarkakis, CEO of Hydrogen Europe, commented: "What is absolutely positive is the recognition in the study of the central role of hydrogen – alongside renewable electricity – for the decarbonisation of European industries.

"What is also encouraging is the recognition that these quantities of hydrogen can be produced in Europe in the next 25 years and do not have to be imported."

He added: "For Germany, however, the study is also a wake-up call. In the model, Europe's largest economy is theoretically eliminated completely as a producer of hydrogen and, due to a lack of competitiveness, becomes the main importer alongside Belgium and the Netherlands – mainly from France, Spain, and the UK. However, a prerequisite to this is the development of a corresponding European infrastructure that can transport and store hydrogen."

The study estimates that hydrogen and electricity will together represent up to 80 per cent of all energy use by 2050, corresponding to a demand of about 8000 TWh, mostly supply by renewable energy sources.

The study highlights that a strong hydrogen network is crucial to maximise the least-cost renewable resources, overcoming potential limitations such as insufficient electricity infrastructure. As such, Europe must recognise the need for a hydrogen backbone and the role of the existing gas pipeline networks as essential to a new and unified European energy infrastructure.

EU more vulnerable to global energy market volatility in absence of Russian gas

The EU's success in slashing its dependence on Russian gas has left it more vulnerable to the volatility in global energy markets.

Although the bloc managed to stave off an energy crisis last year by rapidly increasing imports of liquefied natural gas (LNG), a surge in European gas prices in August showed that European energy prices are now more sensitive to supply disruptions from around the world.

On August 9th European natural gas prices surged nearly 40 per cent as potential strikes at several large Australian LNG projects, which account for about 10 per cent of global seaborne gas supplies, caused alarm in markets.

Tom Marzec-Manser at energy consultancy ICIS, said: "The potential for strike action at LNG export plants in Australia once again highlights the fact that we are now clearly in a globalised gas market. Europe has understandably backfilled Russian pipeline supply with versatile LNG. But that versatility leads to increased price volatility."

Goldman Sachs warned European gas prices could double or even triple this winter.

Kaushal Ramesh, head of LNG analytics at Rystad Energy, noted that although Europe sits on a comfortable level of reserves now, "the market remains unstable as this winter could still turn out severe and rapidly deplete storage".

Energy analysts said the markets remained wary of any potential supply disruptions, even though prices are substantially lower than the peaks of last summer when the slashing of Russian pipeline gas supplies saw gas prices rocket to record highs above €340/MWh.

"Even if gas storages are full, that doesn't necessarily mean everything is fine," commented Callum Macpherson, head of commodities at Investec.

"It comes down to the winter we have, which is unknown at the moment," he said, adding that there were still "significant tail risks" to Europe's gas situation.

In 2021, LNG accounted for about 20 per cent of the EU's overall gas imports. Last year it made up 34 per cent of the EU's gas imports. In 2023 it is expected to rise again to 40 per cent – the amount the bloc was importing via pipeline from Russia prior to the invasion.

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Chile plans to accelerate shift to sustainable energy

- Ministry begins dialogue on speeding up coal plant closures
- MoU signed with Japan's international bank on expanding hydrogen industry

Janet Wood

Chile's Ministry of Energy has announced plans to bring forward the closure of all coal fired power plants in the country by ten years to 2030 and has "launched a dialogue" with stakeholders to prepare a new decarbonisation plan.

The ministry is undertaking dialogue sessions with civil society, academia and industry, with work revolving around three central themes: modernisation of the grid and related infrastructure; decarbonisation, conversion and transitional fuels; and the just transition.

The previous decarbonisation plan, produced in 2019, followed a similar discussion path and was accompanied with a government agreement with utility majors to start closing down all 28 coal fired power plants in Chile by 2040 at the latest.

Between 2019 and 2022, eight coal burning units ceased operations. Italy's Enel closed three, France's Engie four and AES Andes (formerly AES Gener) shut down one plant. Of the remaining 20 units, 12 have set a date either for closure or for conversion to burn biomass and natural gas or are waiting for the national energy commission to respond to a request for closure by January 2025. Eight units do not have any closure commitment, and one of this group is now owned by a company that was not involved in the consultation.

Environment group Chile Sustentable, which published the power plant figures, believes that it is possible for Chile to close all of its coal based power plants by 2030. In the report it said that such a move would require the state to show leadership, eliminate subsidies for fossil-fuel generation, remove regulatory obstacles that stand in the way to wider installation of non-conventional renewables and energy storage, address technological challenges and the socio-economic and environmental impact of the transformation.

Chile had also published a 'National Green Hydrogen Strategy' in November 2020, setting out plans to become one of the world's leading exporters of green hydrogen by 2040. Japan Bank for International Cooperation (JBIC) recently signed a memorandum of understanding (MOU) with Chile's Ministry of Energy.

Japanese companies are already active in Chile's hydrogen and ammonia business, driven by Chile's abundant renewable energy sources. JBIC highlighted plans to focus on hydrogen and ammonia when it set out a response to the energy transformation in its Fourth Medium-term Business Plan, released in June 2021.

The MOU will see development of a framework for collaboration between the two organisations. On Chile's side, the MoU will include promoting cooperation in sectors that use hydrogen and ammonia as a fuel source.

Canada sets out new regulations for power plant greenhouse gas emissions

Canada has released new draft Clean Electricity Regulations that will establish strict greenhouse gas emissions standards on electricity generated from fossil fuels. The accompanying Regulatory Impact Analysis Statement said that "a transformational change will be required in every sector of the Canadian economy including the electricity generating sector" to achieve Canada's climate goals.

The regulations have three aims: to achieve net zero emissions from the electricity grid by 2035; to maintain electricity affordability; and to maintain grid reliability.

The new regulations will take effect on 1 January 2025 and from 2035 they will apply to all electricity generation produced using fossil fuel with capacity of 25 MW or greater and connected to an electricity system.

The requirement to connect means in practice the regulations will not apply to many northern Canadian communities that currently rely on diesel generators and local systems for their electricity. Any fraction of power generated with carbon capture and storage is also exempted. However, the regulation's definition of fossil fuel includes hydrogen, requiring all carbon dioxide emissions associated with the production of hydrogen used for power generation to be quantified and included in the unit's total emissions.

US invests $1.2 billion in direct air capture technology

The US Department of Energy has chosen two direct air capture (DAC) projects being developed in Texas and Louisiana to receive a total of $1.2 billion in investment.

The Biden administration wants the grants to help commercialise the processes, drive down costs and kickstart a rollout. "These hubs are going to help us prove out the potential of this game-changing technology so that others can follow in their footsteps," said Jennifer Granholm, US Energy Secretary.

The Texas project is being built by Occidental and 1PointFive with the King Ranch land management group in Kleberg County. Occidental, Chief Executive, Vicki Hollub, said the investments would "position the US as the location" to demonstrate the commercial viability of direct air capture "at climate-relevant scale".

The second hub, dubbed Project Cypress in southwest Louisiana, is being driven by applied science group Battelle in co-operation with technology developers Climeworks and Heirloom.

The International Energy Agency lists just six DAC plants under construction. The first, in Iceland, is expected to start up in 2024 and there are up to 30 in the pipeline.

The funding is the first tranche of a $3.5 billion pot set aside for four DAC hubs under the Bipartisan Infrastructure Law passed in 2021.

Brazil explores grid strengthening options after blackouts

- Ancillary markets, autonomous local generation proposed
- Solar and wind generation continues to grow

Janet Wood

Brazil's system operator may open up markets for ancillary grid services, it was suggested after the country suffered successive blackouts.

The country's National System Operator (ONS), the body responsible for monitoring and operating the country's electricity grid, is investigating recent blackouts that took place in Ceará and separately in a widespread blackout across 25 states. Both blackouts started with an overload in a transmission line in Ceará, owned by an Eletrobras subsidiary. However, ONS said the fault was not solely responsible for the disruption.

Roberto D'Araújo, an electrical engineer at the Ilumina Institute, pointed at export of wind and solar power between different regions. He noted that these sources do not provide inertia to the system, whereas other rotating plant like gas and hydro turbines help keep it stable. D'Araújo said that the electricity sector is considering starting to charge for this treatment and "there is already talk of creating a kind of tariff".

He said: "The system as a whole needs to have the capacity to compensate for variations in both the sun and the wind."

Brazil's interconnected system, the SIN, connects most of the south, southeast, midwest, northeast and north, except for Roraima state. João Guilherme Mattos, Chief Executive of Brazilian holding company Oncorp, suggested the system needed subsystems with autonomous generation in the country's main load centres. He said: "We've noticed that the interconnected system hasn't improved over time. That's why there's a lot of talk about creating subsystems, where you could mitigate the effects of a cause like what happened."

Past blackouts in Brazil had various causes: from a lack of power generation – as happened in 2001 when drought cut hydroelectric generation – to transmission failures.

Ivan Camargo, a professor of electrical engineering at the University of Brasilia (UnB), said Brazil has "comfortable" power supplies with good water reserves in its hydro system. In the first half of 2023, it exported electricity to neighbouring countries.

Meanwhile Brazil has passed 10 GW of operating power in large solar plants, equivalent to more than half the installed capacity of the Itaipu hydroelectric plant, according to the Brazilian Solar Energy Association (Absolar). With another 22.5 GW of small-scale solar generation, including on rooftops, solar currently totals 32.5 GW of installed capacity.

Ronaldo Koloszuk, Chairman of Absolar's Board of Directors, said: "Brazil has one of the best solar resources on the planet."

US offshore wind developers want to reopen PPAs

BP and Equinor are renegotiating the power purchase agreements (PPAs) for their offshore wind projects in the USA, *Reuters* has reported. It quoted comments from BP Chief Executive Bernard Looney, who said the projects off the US east coast would have to meet "return thresholds of 6 per cent to 8 per cent".

BP and Equinor are jointly developing Empire Wind 1 (810 MW), Empire Wind 2 (1.3 GW) off New York, and Beacon Wind 1 and 2 (2.4 GW) off Massachusetts.

Reportedly another offshore wind developer, Avangrid, had previously paid a $48 million penalty to terminate the PPA for the Commonwealth Wind project off Massachusetts.

SouthCoast Wind, a joint venture between Shell and Ocean Winds, is also said to be in discussions to rebid its PPA for the SouthCoast project. The projects were said to be no longer viable due to economic conditions.

However, companies continue to bid on new projects. US-based Invenergy and energyRe have bid to develop the 2.4 GW Leading Light Wind project off Long Beach Island with 253 MW of battery storage. "Our proposal for New Jersey represents critical investments in energy infrastructure, local resiliency, and a just transition to a green economy," said Ryan Brown, Chief Operating Officer for energyRe.

Vietnamese power plan lacks mechanisms to attract private investors

- Renewable energy to represent 15-20 per cent of energy mix by 2030
- Over $400 billion needed for generation and transmission between 2031-2050

Syed Ali

Vietnam's recently approved National Power Development Plan 8 (PDP8) lacks mechanisms to attract private investors, including green financing from foreign financial institutions, according to the Ministry of Planning and Investment (MPI).

"Securing the necessary financial sources remains a challenging issue, which may pose various obstacles to the successful implementation of the country's power plan," said MPI in a public statement.

The PDP8 plan sets a target for the share of renewable energy in the total primary energy to be 15-20 per cent by 2030 and about 80-85 per cent by 2050. It also aims to achieve energy savings of about 8-10 per cent by 2030 and about 15-20 per cent by 2050 compared to the normal development scenario.

By 2030, the plan aims to establish and develop several clean energy centres in the northern, central, and southern regions when favourable conditions are available. It also intends to develop new energy production to meet domestic and export demands. The capacity of green hydroelectricity production is estimated at about 100 000 – 200 000 tons per year by 2030 and about 10-20 million tons annually by 2050.

The projected greenhouse gas emissions as a result are about 399-449 million tons by 2030 and about 101 million tons by 2050. The goal is to cut the emissions by 17-26 per cent by 2030 and about 90 per cent by 2050 compared to the normal development scenario.

To achieve these goals, six implementation solutions were set out, involving capital mobilisation and allocation; mechanisms and policies; environment, science, and technology; human resource development; international cooperation; and implementation and supervision of the plan.

Under the Plan, the capital requirement for the development of power sources and transmission grids was estimated at nearly $135 billion. Of which, $119.8 billion was allocated to power sources, averaging $12 billion per year, and $14.9 billion to transmission grids, averaging $1.5 billion per year.

For the 2031-50 period, the estimated capital requirement for the development of power sources and transmission grids ranges from $399.2 billion to $532.1 billion. Of which $364.4 billion to $511.2 billion were allocated to power sources, averaging $18.2 billion to $24.2 billion per year, $34.8 billion to $38.6 billion to the transmission grid, averaging $1.7 billion to $1.9 billion per year.

Given the substantial amount of capital requirement of the plan, MPI stressed the importance of participation from all economic players, as well as the diversification of funding sources, including foreign partners as a key component to the plan's success.

As of now, there was not yet a working mechanism for encouraging and selecting private investors in the power sector, which may help ensure PDP8's smooth progress.

"We have observed instances in which projects experienced prolonged delays, even in the investment phase; instances in which projects were approved and assigned but not yet implemented or were being carried out at an extremely slow pace. There were even instances in which capacity for implementation was not met but projects were not revoked," said MPI.

Meanwhile, there are problems that must be worked out between power suppliers and Electricity Vietnam (EVN) regarding supply contracts and pricing as wind and solar power investors continued to voice their grievances over difficulties in price negotiations and extending project deadlines with the Power Trading Company (EVNEPTC) a subsidiary of EVN.

Experts have warned current disagreements over pricing could slow down the sector's development, while leaving a significant portion of the country's power capacity stranded.

Supply chain expansion will boost Indonesian solar power exports

Renewable energy company Vena Energy has signed a landmark framework agreement that will support the country's plan to become a leading regional solar player and drive efforts to achieve its net zero target.

The agreement signed with PV module manufacturer Suntech; energy storage company Powin; and battery cell producer REPT Battero, a leading for energy storage systems, aims to explore opportunities for the establishment of local production lines for components of solar photovoltaic panels and energy storage systems.

These components are also intended to support Vena Energy's hybrid megaproject in the Riau Islands currently under development. The project is set to feature up to 2 GW of solar power capacity and a battery energy storage system potentially capable of storing in excess of 8 GWh of clean energy, making it one of the most significant renewable energy initiatives in Southeast Asia.

The electricity produced by the company would be supplied across the border to Singapore through Shell Eastern Trading, a Singapore-based subsidiary of UK-based oil and gas giant Shell.

Nitin Apte, CEO of Vena Energy said: "With this Framework Agreement, we aim to significantly contribute to the development of a productive domestic supply chain in the renewable energy sector, which will support Indonesia's energy transition plan and enhance the local economy by creating jobs, fostering industrial expansion and opening export opportunities in this growing sector of the economy."

President Joko Widodo recently said that Indonesia is on track to become the largest integrated solar industry in the region, supporting the 23 per cent renewable energy target and net zero emission goals.

Under the auspices of the "Long-Term Strategy for Low Carbon and Climate Resilience 2050" announced by Widodo in 2021, the Framework Agreement supports the Indonesian government's aspirations of aligning climate goals with national and international objectives, emphasizing the development of local talents, enhancing climate literacy, and fostering sustainable economic growth.

Indonesia has an ambitious plan to reach carbon neutrality by 2060 by transitioning from conventional energy to clean energy. The agreement will provide a much needed boost for the plan. Recent figures from the Energy and Mineral Resources Ministry showed that renewable energy investment fell well below the target set for this year.

Investment amounted to $527 million in the first half of 2023, which is just 29.4 per cent of the full-year target of $1.79 billion. The $527 million figure includes $214 million for geothermal energy, $82 million for bioenergy, $223 million for various other new and renewable energy projects, as well as $8 million for energy conservation.

Installed renewable power capacity stood at 12.73 GW in mid-2023, 15 per cent of the national energy capacity of 84.8 GW, according to the Energy Ministry's Director General in charge of renewables, Dadan Kusdiana.

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Malaysia's energy transition gathers pace

Malaysia has announced several projects ahead of the UN COP28 climate summit in Dubai, as the country ramps up efforts to transition to clean energy.

At the end of July, the UAE's clean energy powerhouse, Abu Dhabi Future Energy Company PJSC, or Masdar, and Citaglobal Berhad, signed a memorandum of understanding (MoU) for the joint development of renewable energy projects across solar, battery energy storage system (BESS), wind and other renewable energy technologies.

The MoU will see the companies join forces to develop projects across the renewable energy mix, including solar, battery energy storage system (BESS), wind and other renewable energy technologies, in the Malaysian state of Pahang. Malaysia is targeting net zero emissions by 2050.

Commenting on the tie-up Mohamed Jameel Al Ramahi, Masdar's Chief Executive Officer, said: "We look forward to pioneering energy solutions to reduce emissions in Malaysia and the region. As the UAE looks ahead to hosting the UN climate change conference, COP28, later this year, Masdar is proud to be working with partners to advance clean energy solutions around the world."

Citaglobal Berhad Executive Chairman and President, Tan Sri (Dr) Mohamad Norza Zakaria, said: "By collaborating with a leading energy transition player, we will make faster progress towards our climate targets, besides building our long term energy requirements in a responsible and cost efficient manner."

In a separate development UEM Group Bhd, a wholly-owned subsidiary of Khazanah Nasional Bhd, has tied-up with local and foreign investors to develop a 1 GW hybrid solar photovoltaic or PV power plant integrated with a renewable energy (RE) industrial park in Malaysia.

The project will be developed by UEM Group in collaboration with local investor Itramas Corp Sdn Bhd, which is the largest vertically-integrated solar plant developer, as well as engineering, procurement, construction and commissioning and service provider in the country.

The parties said the RE industrial park would attract foreign manufacturers and suppliers across the RE and electric-vehicle (EV) value chains, as well as other high-tech companies to set up operations and research and development facilities. This will drive the growth of the overall energy transition and EV ecosystems in the country.

Advancing the use of hydrogen is also part of Malaysia's transition drive. Efforts to ramp-up hydrogen production gathered pace in late July as Tenaga Nasional Bhd (TNB) and Petronas inked a joint feasibility study agreement (JFSA) to advance studies for hydrogen business development.

TNB said in a statement: "Building upon the earlier signed memorandum of understanding, the JFSA underscores the commitment of both industry leaders to collaborate and foster a strong synergy in exploring and developing business ventures in the emerging field of green hydrogen."

Philippines needs grid investment to support growing renewables

The Philippines' Undersecretary of the Department of Energy and President and CEO of the National Transmission Corp. (Transco), Rowena Guevara, has admitted that most of the country's planned renewable capacity has not yet been included in the Transmission Development Plan (TDP).

The Department of Energy (DOE) is eyeing grid integration of up to 94 GW of additional power capacities that are already on the roll of projects undergoing pre-development phases. These planned power facilities comprise of 176 targeted wind farm installations; 162 hydropower ventures; 108 solar projects; 21 geothermal projects; and one ocean energy undertaking.

But there are questions over whether this can be absorbed by power transmission network of the National Grid Corporation of the Philippines (NGCP).

"If we look at the current TDP and the submission of NGCP for its fifth regulatory reset, it can be observed that 50 000 MW of the listed projects are not there," said Guevara.

To address the situation Guevara indicated that the DOE plans "to come up with a smart and green grid system (SGGS), which encompasses all of those things that are not in the list of NGCP".

Less clear at this point, however, is how the government will pursue the construction of new high voltage lines and reinforcement of the transmission system within the bounds of the industry's current set-up wherein transmission facilities are managed and operated under a third party private concession.

"As a starting point," Guevara said, "we're planning to get the numbers for each year: what's the scale of transmission lines required and where these (lines) would be installed."

Investors in renewable energy (RE) projects have been outspoken in raising concerns that grid integration is a major dilemma, warning that their facilities could suffer curtailments that could then result in foregone revenues or losses.

Unless the issue is addressed, it is expected that without government assurances, even the forthcoming round of renewable energy auctions could be disappointing.

Aboitiz Power Corp. (AboitizPower) through its renewable energy arm Aboitiz Renewables, Inc. (ARI), is set to build two new solar power projects in Negros Occidental and Zambales, further expanding its renewable energy capacity. The energy company said it will build a 173 MW solar power project in Calatrava, Negros Occidental that is expected to start exporting power by 2024. ARI is also set to build a 211 MW solar project in Olongapo, Zambales – its largest solar project to date.

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Europe bets on major new investment in solar PV

- New support packages in Germany and Italy
- Targets announced in Portugal, Czechia and Albania

Janet Wood

The German government has passed 'Solar Package 1' – comprehensive measures aimed at tripling annual solar capacity installations from 7.5 GW in 2022 to 22 GW in 2026. It has also allocated 1.7 GW of solar capacity in the latest tender round

Land will be made available for PV installations, including on parking lots, while bureaucratic hurdles for rooftop systems will be eliminated, which witnessed a remarkable surge of interest, with projects vying for subsidies totalling 4653 MW.

Federal Network Agency President Klaus Mueller said: "Never before have so many bids been received in this tender." The next tender round is scheduled for December 1, with a separate segment for PV with dual land use like agri-PV, parking lots and floating solar plants. The solar industry welcomed the measures. Industry association BSW said that the legislative changes will remove market barriers and will simplify the expansion of solar energy in many areas.

Germany was just one of several European countries that have recently boosted their PV deployment.

The Italian government is consulting a new subsidy scheme for renewables with competitive tenders in 2024-2028. The largest portion is for 45 GW of solar photovoltaic projects, including simplification of the permitting process for projects larger than 10 MW. Last year 2.48 GW of solar was brought online.

Czechia's CEZ plans to build 1.5 GW of solar plants by 2025 and up to 6 GW by 2030, using locations near its existing plants as well as leased land. CFO Martin Novak said that was because of the domestic conditions and long permitting process for wind farms. Novak said CEZ had a large number of potential locations "either in the area of our power plants and their surroundings or sites that are suitable for this purpose and we have them under lease agreements or option agreements".

Portugal's Ministry of the Environment has awarded permits for 5 GW of transmission-connected solar power. The country will also add 1 GW of low-voltage projects. Portugal has accelerated a timeline to 80 per cent renewables, and now wants to achieve this milestone by 2026, four years earlier than originally planned, and reach net zero by 2045.

Albania's solar rollout has been boosted by the Swiss State Secretariat for Economic Affairs (SECO), which financed technical assistance for a 2021 tender. To date, Albania has awarded tenders for 240 MW of solar power and it is now preparing to launch a new 300 MW solar auction in the coming months, again financed by SECO.

Netherlands set to support green hydrogen as Germany expands its strategy

The European Commission has given state aid clearance to a €246 million Dutch scheme to support production of renewable hydrogen.

The scheme will support at least 60 MW of electrolysis capacity, with direct grants for seven to 15 years awarded through a competitive bidding process to be concluded in 2023.

The Netherlands wants to have 500 MW of electrolyser capacity in 2025 and 3-4 GW by 2030.

Executive Vice President Margrethe Vestager, in charge of competition policy, said the scheme "will help ramping up the production of renewable hydrogen and facilitate the greening of sectors that are otherwise difficult to decarbonise. The aid will support the most cost-effective projects. And this while minimising possible distortions of competition."

Meanwhile an updated German hydrogen strategy envisions hydrogen usage of 95-130 TWh for 2030. The German government also raised the goal for domestic electrolysis capacity from 5 GW to 10 GW and the production of synthetic natural gas has also been included in the strategy.

The strategy suggests 50-70 per cent of the country's needs will be imported, largely through ship-based transport of hydrogen and its derivatives. A separate strategy on hydrogen imports is due to be published by the German government, by the end of 2023.

Baltic states to speed up synchronisation with Europe

The Prime Ministers of Estonia, Latvia and Lithuania have signed a joint declaration agreeing to synchronise their power grids with the European network by February 2025, almost a year earlier than planned, and to desynchronise from the Russian power grid.

Estonian Prime Minister Kaja Kallas said: "We are working with Lithuania and Latvia to eliminate any dependence on Russian energy.

"Russia's aggression in Ukraine and the use of energy as a weapon prove that it is a dangerous and unpredictable country, and therefore being in the Russian power grid is a risk to Estonian consumers."

Estonia, Latvia and Lithuania were occupied by the Soviet Union from WWII until 1991 and they inherited an energy infrastructure linked to Russia. Plans to synchronise the grids with Europe were agreed in 2019 by the states, the European Commission and Poland. At the time, the deadline was set for the end of 2025. The new agreement follows a decision made by the Baltic Prime Ministers on May 12th in Tallinn. "Although we think the electricity systems of the Baltic countries would basically be ready for synchronisation earlier than February 2025, united action in performing the remaining projects is important," Lithuania's Prime Minister Ingrida Simonyte said in a statement.

Offshore wind developers struggle with rising costs

- UK project falls victim to lack of price flexibility
- Floating and fixed wind projects continue to attract investors

Janet Wood

The expansion of offshore wind farms has faltered as price increases hit planned installations. Well-advanced projects have been completed – Europe installed 2.1 GW of offshore wind in the first half of 2023 and its total has reached 32 GW, according to WindEurope – but the rate of installations in the EU is well below the 11 GW a year needed between now and 2030.

During the year just six projects reached final investment decision, representing 5 GW of new capacity. There are bottlenecks in the supply chain and the availability of installation vessels, and WindEurope called for governments to fully index auction prices to account for inflation.

WindEurope said: "Offshore wind turbine costs have increased by up to 40 per cent over the last two years. If governments don't recognise that, they'll lose projects, just like the UK has lost Vattenfall's Boreas offshore wind project." Swedish wind developer Vattenfall halted plans for that UK wind farm, saying rising costs meant it was no longer viable under the fixed electricity price it had agreed with the government.

Mads Nipper, Chief Executive of Ørsted, said he would "find it surprising if there'll be a big appetite" for an upcoming UK tender, because the maximum electricity price was not high enough to offset wind companies' rising costs.

Projects are still attracting investors, however, where they see returns. RWE Clean Energy, Vattenfall, and Waterkant Energy all won in an auction conducted for four wind farms aggregating 1.8 GW in the German North Sea. PGE has won European Investment Bank support in financing Germany's Baltica offshore wind farm with a €1.4 billion financing package.

Meanwhile UAE energy company Masdar has signed a strategic agreement with Iberdrola to co-invest in the 476 MW Baltic Eagle offshore wind farm in the German Baltic Sea. Octopus Energy has also announced plans to invest £15.5 billion in offshore wind projects and farms by 2030.

Norway is an upcoming test for investor appetite. It has postponed the application deadline for its first large offshore wind areas, Sorlige Nordsjo II and Utsira Nord, because state aid clearance will take longer than foreseen, but Norway still aims to have the first turbines in operation by 2030 and is still planning to announce new offshore wind areas in 2025.

Norway recently opened the world's largest floating offshore wind farm, Hywind Tampen, with 11 turbines. The Equinor-led project with a capacity of 88 MW will supply electricity to oil and gas platforms in the North Sea. "Today we are making history," said Norway's Prime Minister Jonas Gahr Støre.

UK promises support for two CCS projects, now has four planned this decade

The UK government has named two further carbon capture and storage (CCS) projects it hopes will be built this decade. It selected two other projects, in the northwest and northeast of England, in 2021.

The two new projects are Acorn in Scotland and Viking in England's Humber region.

Ruth Herbert, Chief Executive at the Carbon Capture and Storage Association, said time was running out to build the required infrastructure, saying: "Billions of pounds of investment is waiting to be deployed to decarbonise these industrial regions, but firm plans are required to secure it."

Storegga is the developer of the Acorn project, backed by oil and gas producers Harbour Energy and Shell. Storegga Chief Executive Nick Cooper said the company was ready to "roll its sleeves up… [and] sit down with the government and crack on" to discuss how state backing for the project would work.

The Viking project is led by Harbour Energy with backing from BP. Viking Director Graeme Davies said he was confident it would be capturing carbon by 2030 but warned: "I think they're very ambitious targets the government has set and that's the scale of decarbonisation the UK needs. There's a lot to do – these are major infrastructure projects that take a decade or more to deploy at scale."

Energy UK said the long-term viability of CCS relied not just on government support but a robust carbon price.

Oman plans to add 4 GW of renewables by 2029

- Growing electricity demand sparks renewables boost
- Plans to develop solar, wind and waste-to-energy plants

Nadia Weekes

Nama Power and Water Procurement Co (PWP), the sole offtaker of electricity from independent power plants in Oman, is to solicit about 3 GW of new solar and wind power capacity from developers by 2029 in addition to 1 GW that has already been awarded.

Oman has a 500 MW solar farm and a 49.9 MW wind farm in operation. Earlier this year, it awarded the Manah I and Manah II solar projects with a combined capacity of 1 GW to developers. The two sites should be connected to the grid in 2025.

Several new solar, wind and waste-to-energy plants are planned to be built in the next few years as electricity demand in the Sultanate is expected to grow, according to PWP's seven-year statement for 2023-2029.

PWP, previously known as Oman Power and Water Procurement Company (OPWP), plans to issue a request for qualifications for the 500 MW Ibri III solar project in September 2023, targeting the end of 2026 for the start of commercial operations.

Another 500 MW solar project, MIS Solar IPP, is to be developed in the Al Wusta region by 2027, although both its location and capacity may change.

A sixth utility-scale solar project with a targeted commercial operation date in 2029 is planned to add a further 1 GW. The capacity will be split between two sites and could be awarded to different developers.

As for wind energy, PWP plans to issue a request for qualifications for two new wind projects in September, followed by a request for proposals for both schemes in the first quarter of next year. Duqm Wind IPP, with a capacity of between 200 MW and 300 MW, is to be located in the Duqm region.

A second wind project, JBB Wind IPP, is to be developed at Jalan Bani bu Ali in North Sharqiyah Governorate, with an estimated capacity of 100 MW. Four more wind projects should add 600 MW of capacity between 2027 and 2029.

In addition to wind and solar, Oman is planning to build a waste-to-energy plant in Barka, a coastal city in the north of the country. A feasibility study for the project was completed in 2018. A plant with a capacity of 130-140 MW will be powered by municipal waste collected from Muscat and South Batinah Governorates. The request for proposals is to be issued by the end of this year.

EU signs €307 million grant for Italy-Tunisia interconnector

Italian power grid operator Terna and its Tunisian counterpart STEG have signed a deal with the European Commission for a €307 million ($336.7 million) grant for the construction of an interconnector between Italy and Tunisia that will serve as a power bridge between Europe and North Africa.

The ELMED interconnection will have a capacity of 600 MW and will require about 200 km of electricity cables running at a depth of up to 800 m between converter substations in Partanna, Sicily and Mlaabi, on the Tunisian peninsula of Cape Bon.

Implementation of the project is expected to require an investment of roughly €850 million. The EU grant is provided through the Connecting Europe Facility (CEF) fund, a European initiative committed to endorsing projects that foster energy infrastructure development within the bloc.

In addition, the World Bank has recently provided Tunisia with a financial package totalling $268.4 million for various purposes including construction of the converter substation and grid upgrades needed for the interconnection to function.

Commenting on the grant, Terna's Chief Executive Giuseppina Di Foggia said: "ELMED will enable the development of renewable energy and, at the same time, deliver economic and industrial benefits, attracting investment and creating new jobs."

The ELMED initiative is expected to facilitate the integration of electricity markets, enhance energy procurement security and foster investments in renewables in both Italy and North Africa.

Algeria opens bids in 2 GW solar tender

Algeria's state-owned utility Sonelgaz has opened the 90 proposals it has received as part of an auction to award projects for the construction of 15 solar farms with a combined capacity of 2 GW.

The auction was launched in March and attracted interest from 140 candidates – 34 from Algeria and 106 from other countries. The tender solicits contracts for solar projects with individual capacities ranging between 80 MW and 220 MW.

The 15 solar power plants will be located in 12 provinces from Algeria's south to the Hautes Plaines in the Atlas Mountains in the north.

At the bid opening ceremony in late July, Energy Minister Mohamed Arkab hailed the scheme as the initial stage of an ambitious programme for developing renewable energy in Algeria, aiming to achieve 15 GW of solar photovoltaic (PV) energy by 2035.

Arkab also announced that the bids in a 1 GW solar PV auction launched in December 2021 will be opened in September.

Sonelgaz intends to launch a 3 GW project in November 2023, bringing Algeria's total solar power pipeline to 6 GW.

Ghana aims to begin nuclear power production by 2030

- Nuclear power 'key to industrialisation and economic development'
- Local content role calls for drive to raise standards and skills

Nadia Weekes

Ghana has set a target to begin producing nuclear power by 2030 to ramp up electricity generation and promote industrialisation and economic development, according to Stephen Yamoah, Director-General of state-owned Nuclear Power Ghana (NPG).

At a press briefing in early August, Yamoah said that Ghana has concluded the first phase of the roadmap towards nuclear power. In the second phase, it would identify a site for the reactor, the type of technology to deploy, and the vendor whose terms are most suitable for the country.

"Nuclear is the desirable energy source for Ghana because we do not have many options for power generation," said Yamoah. "It is not just the power: the potential to drive other industries is huge because of its durability," the official added.

Ghana is insisting with prospective vendors that local content should be included in the country's first nuclear power plant. This is to ensure the use of Ghanaian local expertise, goods and services, and financing in the nuclear power programme.

Yamoah said that NPG was engaging stakeholders, including the Association of Ghana Industries, to discuss the standards and skills needed to harness opportunities in the sector.

"Our local industries have an important role to play and need to brace themselves for the task ahead," Yamoah said. "For instance, at the construction stage, there are opportunities for carpenters, electricians, iron workers, insulators, masons, labourers and painters." Yamoah added that NPG was also engaging with technical and vocational institutions to train students on the required skills.

He said that pushing for local content was important but that Ghana needed to show it could deliver on it, to avoid risks and costs. "The dome of the nuclear plant has a steel component," Yamoah explained. "When this is awarded to a local vendor, a good job is expected, not a poor job where the vendor will use scrap metals as raw materials."

The nuclear power programme is expected to "take shape" with the selection of a partner and technology by the end of 2023, according to Yamoah.

Nii Kwashie Allotey, director-general of the Nuclear Regulatory Authority, said his organisation was committed to ensuring that safety, security and safeguards were prioritised as the country prepared to build a nuclear power plant.

Allotey said the NRA was building the capacity of its staff and cooperating with international bodies to benefit from their expertise.

Saudi Fund signs $77 million loan agreement for solar in Belize

The Chief Executive of the Saudi Fund for Development (SFD) has agreed to loan Belize $77 million to develop a solar power plant with a capacity of 60 MW in the country.

The project aims to reduce emissions in the energy sector while stimulating social growth and offering direct and indirect job opportunities. It is estimated that it will avoid the equivalent of 60 000 tonnes of carbon dioxide annually and reduce dependence on energy imports.

Since 1975, the SFD has conducted more than 700 projects and developing programmes in 90 countries around the world. The $77 million loan is the second agreement funded by SFD in Belize.

Johnny Briceño, Prime Minister of Belize, said that the project was coming at the right time for the country. "The project is in line with our policy of focusing on supporting renewable energy, which will bring several benefits to Belize, such as cost savings, energy independence, environmental sustainability, creating job opportunities, as well as improving access to electricity for the rural community," he said.

SFD's CEO, Sultan Bin Abdulrahman Al-Murshed, said that the agreement was an important step towards enhancing the existing development cooperation between SFD and Belize. He said it also reflected the importance of international cooperation and solidarity to promote sustainable growth and prosperity.

A steely resolve to cutting carbon emissions

Reducing carbon emissions in steel production is crucial in achieving global net zero CO_2 targets. Siemens Energy is collaborating with European steel producer Salzgitter AG to help reduce emissions from its steel production process. But it is a partnership that is also helping Siemens Energy to cut its own Scope 3 emissions. **Junior Isles** explains.

The importance of decarbonising the steel industry cannot be understated. According to a 2021 report by the World Steel Association, steel production accounts for between 7 and 9 per cent of global CO_2 emissions. More recently, in its Tracking Clean Energy Progress 2023 report, the International Energy Agency (IEA) estimates that it accounts for 8 per cent of primary production in 2030 in its NZE (Net Zero Emissions) Scenario. The IEA therefore stresses that innovation is crucial for the commercialisation of new near zero emissions steel production processes.

Fortunately, both the steel industry and major players in the energy sector have not been sitting on their hands. Although the current pipeline of low- and near zero-emission projects in the steel industry falls short of what is required to meet the NZE Scenario, important progress is being made.

Commenting on the size of the problem of CO_2 emissions from steel production, Anand Sengupta, Vice President and Head of Global Sales, Compression at Siemens Energy, said: "In a word, it's as big as 8 per cent of global emissions. The industry has seen a big demand for steel in the last few years. It's a fundamental indicator of economic growth… demand will stay and the problem will grow in size. But today steel production is heavily dependent on coal, which is primarily used for reducing iron ore to so-called pig iron.

"But over the last decade, these emissions have gone up. There has been some improvement in terms of efficiency, i.e. the number of tonnes of CO_2 per tonne(t) of steel. But due to the higher demand, things have really gone south and the overall amount of CO_2 emissions has gone up in a way that now we really need measures to meet the net zero emissions target."

Sengupta: CO_2 emissions have gone up in a way that "now we really need measures" to meet the net zero emissions target

Siemens Energy has secured the contract to deliver and install its advanced centrifugal compressors for compressing hydrogen at Salzgitter. The compressor package features an integrally-geared compressor design, allowing for more efficient compression

"Figures from the Energy Information Administration (EIA) show that producing 1 t of steel produces about 1.9 t of CO_2. And using coal means that CO_2 emissions are not the only problem – methane, nitrous oxides, sulphur dioxide and particulates are also an issue. So this is a very important problem for us to solve."

Siemens Energy has put reducing carbon emissions from industrial processes such as steel production, and indeed its own processes and products, at the heart of its operations. In what is one of the most important projects aimed at cutting CO_2 emissions from steel production, the company has been collaborating with Salzgitter AG on a programme to make steel production more climate-friendly.

Salzgitter AG is one of Europe's leading steel and technology groups. Apart from the carbon used, the company operates its integrated steelworks in Salzgitter, southeast Lower Saxony, Germany, on a virtually energy autonomous basis and closed material loops by reusing residual material and cogenerated products. According to the company, it is "working very close to the limits of what science and technology permits", which puts it "among the world's most efficient producers of steel".

Nevertheless, production in the Salzgitter steelworks generates about 8 million t of CO_2 per year, made unavoidable by processes and by the current status of technical conditions and the facilities available. In order to lower its CO_2 emissions, the company has begun to implement its SALCOS® programme – Salzgitter Low CO_2 Steelmaking.

Although the ambition among steel producers to cut emissions varies from region to region, Sengupta says that, overall, Siemens Energy's customers are "working very hard to define their own individual strategy".

He added: "It depends on the process they are using; how old the steel plant is; and the different local requirements, i.e. whether they are in Europe, US, India or Japan. But most of them want to become climate-neutral by 2045 at the latest."

Sengupta says that the most realistic pathway is to first optimise and electrify. Historically, the most common

blast furnace used by steel producers has been the Basic Oxygen Furnace (BOF). A growing number are shifting towards the electric arc furnace (EAF) to implement a different production route, which is easier to decarbonise. The second part, he says, is "decarbonising operations". This means reducing the carbon in the electricity supply, i.e. using renewables. The third is carbon capture.

"We see some frontrunners – especially in Europe where we are trying to implement, with the government, some concrete actions. Most of the major steel producing countries have targets to reduce emissions by between 15 and 40 per cent by 2030. But the EU has launched a strong push for industries to transition from a high carbon to a low carbon footprint," he said.

"Beyond Europe, the Inflation Reduction Act (IRA) in the US is providing a huge amount of funding [for industries] – around $5.6-5.8 billion – a large part of which will be available to some of the projects in the steel industry."

He noted, however, that the technology aspect is also important, highlighting some of the new technologies that are being deployed. "Sweden, for example is doing a scrap waste steel project that will help reduce carbon footprint. We are also seeing some hydrogen-based direct reduction of iron (H_2-DRI) that will demonstrate the future of how the industry will move forward."

As part of its SALCOS programme, Salzgitter is replacing its existing blast furnaces with direct reduction plants. The company currently produces pig iron, or crude iron, by using coal in its blast furnaces. This releases CO_2 as a result of the process. In direct reduction, iron ore is reduced with the aid of hydrogen. The hydrogen reacts with the oxygen in the iron ore (iron oxide) directly in the solid state and converts it into sponge iron (almost pure iron).

Instead of CO_2, this technology produces water (H_2O), which in turn is reused in the integrated process. In order to be able to process sponge iron further, the porous material is finally melted down together with steel scrap in an electric arc furnace.

The SALCOS programme is already in the midst of implementation. The financing of stage 1 of the programm has been secured through subsidies of about €1 billion from the Federal Republic of Germany (€700 million) and the State of Lower Saxony (€300 million), as well as through the substantial funds of Salzgitter AG, amounting to well over €1 billion. The total investment volume for the first stage of SALCOS is € 2.2-2.4 billion.

Integrally-geared compressor rotor

The SALCOS programme will be implemented in three stages. The first – consisting of a direct reduction plant, an electric arc furnace and a 100 MW electrolysis plant for hydrogen production – will be completed in 2026. Wind power generation has already been installed along with the electrolyser, which produces hydrogen for use in the electric arc furnace. Phases two and three will entail the increased use of scrap.

Salzgitter is targeting at least a 95 per cent reduction in CO_2 emissions by 2033. The company noted: "By setting ourselves the goal of avoiding CO_2 directly rather than storing it or making it usable at great expense (carbon direct avoidance strategy), our concept is sustainable and sets an example for the industry."

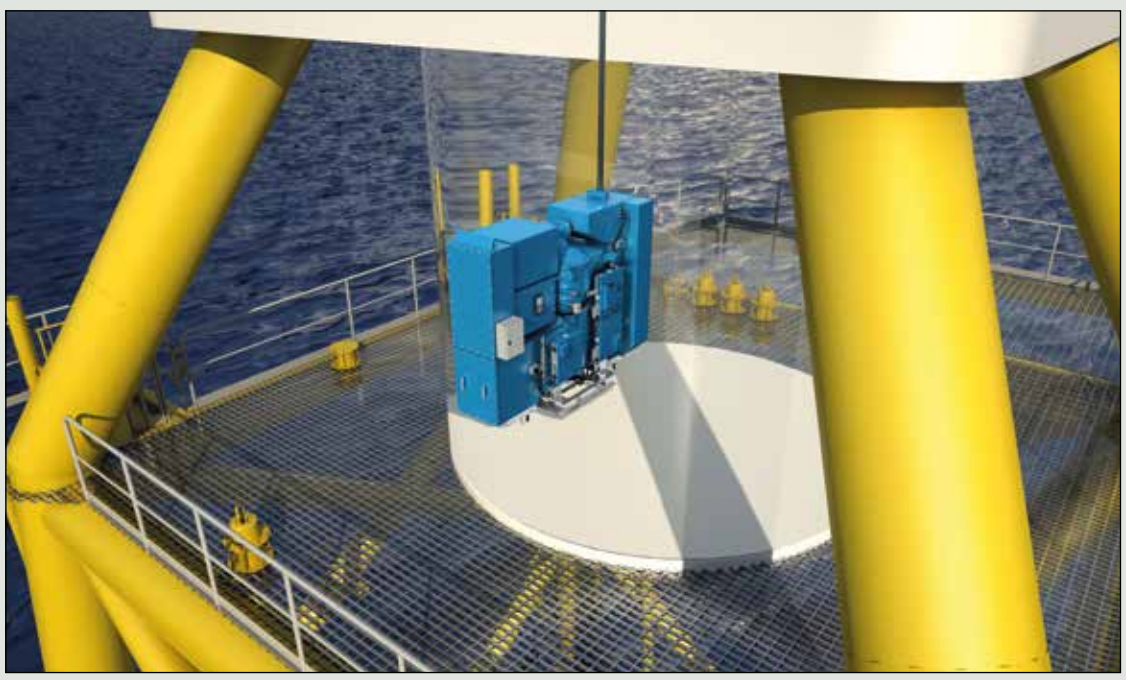
Transformation of the steel production process at the Salzgitter site should be completed by the end of 2033, well ahead of the regulatory requirements.

In May this year Salzgitter reached a major milestone in executing this plan with the order of an 'Energiron ZR Direct Reduction' plant from a consortium of Tenova, Danieli and DSD Steel Group. The consortium will build the DRI plant on the site of Salzgitter Flachstahl GmbH. The unit is the largest sub-plant in the first stage of the SALCOS programme and has a production capacity of more than 2 million t of direct reduced iron per year.

Sengupta commented: "SALCOS has also announced that they will stop using blast furnaces by mid-2030s and replace their coal-based process with a new hydrogen route. That's a massive change. It's a huge change in the plant itself. This transformation is expected to achieve emissions savings of 95 per cent, which is actually 1 per cent of Germany's CO_2 emissions."

Sengupta noted that blast furnaces sites around the world can also use DRI technology similar to that used by Salzgitter. A key benefit here is that operators can switch from natural gas to hydrogen "on the fly". This would allow them to make the transition from natural gas to hydrogen slowly.

Example of an advanced rotor hydrogen compressor



F-gas-free switchgear in an offshore wind turbine: it is important for the wind industry to reduce its carbon footprint through developments such as GIS without SF_6 or other F-gases

"You could initially start with, say 5 per cent hydrogen, and 95 per cent natural gas; or you could have in between 50:50 and switch over from 5:95 to the other way around," said Sengupta. "This is a huge advantage because, without changing the equipment or the process, you can move from point A to point B almost seamlessly."

This is where Siemens Energy compressors play a pivotal role. Sengupta explained: "The process uses natural gas, which has a certain molecular composition, molecular weight, fluid dynamics, etc. But the same process tomorrow has to use a mix or pure hydrogen, which has a different molecular weight and a different kind of fluid dynamics.

"So the compressors need to be flexible and adaptable to handle the wide range of head – the compressor power, the flow that is needed; the pressure ratio that's needed. And the compressors need to be reliable enough to move from a heavy, big molecule, to a lighter, smaller, molecule; so it's really important to understand how the compressors, from a flexibility standpoint, can handle both the gases. Unlike Salzgitter, in

F-gas-free switchgear at the Siemens Energy switchgear factory in Berlin

most cases, the operators would like to switch over from existing natural gas to a mix of hydrogen before completely turning over to hydrogen. The flexibility of not having to change the compression system is a huge advantage on continued production and costs."

Apart from hydrogen, compressors are also used in steel plants to handle nitrogen and oxygen.

Sengupta commented: "There are compressors that handle dry oxygen and these are different from the ones that handle hydrogen and natural gas, and different from compressors that handle nitrogen."

For nitrogen compressors, Siemens Energy has extensive experience in the air separation market. These, says Sengupta, are fairly standard technology but need to be extremely reliable. The oxygen compressors are more complicated: you don't want any flammable material inside. And this is where we have the experience, with years of reliable operation; very few manufacturers can do it. For the natural gas/hydrogen compressors, this is where we also have the experience depending on the size."

Siemens Energy has secured the contract to deliver and install its advanced centrifugal compressors for compressing hydrogen at Salzgitter, with an integrally-geared compressor design driving two compression stages to achieve the required pressure ratio. This portfolio of geared compressors driving up to four shafts at individually optimised speeds allows more efficient compression, further reducing the energy consumption of the plant (and resultant CO_2 footprint).

"This lies at the heart of what we do at Siemens Energy. We have a business area that specifically looks at how we reduce the carbon footprint of industrial processes; steel is one of them," said Sengupta.

Siemens Energy is building on its Salzgitter compressor experience, with plans to install an advanced rotor hydrogen compressor at another steel production plant in Sweden. It will meet the steel producer's requirement for a compressor with higher flow rates.

"This will be phenomenal because you won't need to have multiple compressors running in parallel; you can have one large centrifugal compressor, providing all the pressure ratio and the flow rate at the same time," said Sengupta.

"It's something we are very excited about and are talking to multiple customers about it. The future of green steel will need a portfolio where we are not looking at small multiple units but reliable larger units."

The use of fewer units, he says will mean lower costs, higher reliability and reduced footprint. "Each compressor has its own balance-of-plant, so each time you add one more compressor, the average cost per megawatt goes up.

"Also steel producers are converting in a brownfield situation, so there is a space constraint. If you have a large flow there will at some point not be enough room for multiple compressors; so a larger single compressor with a 1+1 configuration would be a huge advantage."

In addition to compressors, Siemens Energy has also secured a contract to build a substation on Salzgitter AG's premises to connect to the 380 kV 'Salzgitter Industrial Line'.

The scope of the contract covers a 380 kV gas-insulated switchgear (GIS); a 220 kV GIS; substation auxiliary systems; and the entire design engineering. In addition, Siemens Energy will provide four high voltage and medium voltage transformers for the first step of SALCOS.

The substation will be connected via the Bleckenstedt Süd substation of TenneT TSO GmbH to the future 380 kV industrial line that in turn will connect up Salzgitter with the Wahle-Mecklar line. Going forward, this grid connection will allow Salzgitter AG to source the necessary volumes of power from renewable energies.

GIS is in fact another area in which Siemens Energy is already contributing to tackling climate change. The company has launched a range of GIS that has eliminated the use of sulphur hexafluoride (SF_6) – a gas which is used for insulation with a global warming potential 24 300 times that of CO_2.

Siemens Energy has been working on its 'Blue' technology for more than 12 years, initially focusing on lower high-voltage levels, i.e. 72.5 kV. The technology is available for GIS, circuit breakers and instrument transformers all with absolutely zero CO_2 equivalent emissions over the lifetime of the equipment. The technology has been in service around the globe up to 145 kV for several years and is currently being rolled out across Siemens Energy's entire HV switching equipment portfolio up to the highest transmission level of 420 kV.

The company also emphasised that several hundreds of switchgears with Blue technology are already being installed in wind turbines. Big offshore wind farms currently use 72.5 kV, so it developed switchgear especially for wind turbine applications and first installation started in 2017.

Wind power is one of the cornerstones of the green energy transition. With more than 600 GW of new capacity to be installed worldwide in the next five years, it is important for the wind industry to reduce its carbon footprint through developments such as GIS without SF_6 or other F-gases. The work Siemens Energy is doing with Salzgitter also feeds back into this.

In April this year, Siemens Gamesa announced the GreenerTower, a wind turbine tower made of more sustainable steel.

Towers consist of approximately 80 per cent steel plates. The new GreenerTower will ensure a CO_2 reduction of at least 63 per cent in the tower steel plates compared to conventional steel. Siemens Gamesa's new thorough qualification process will verify that only a maximum of 0.7 t of CO_2-equivalent emissions are permitted per tonne of steel, while maintaining the same steel properties and quality.

Salzgitter AG, with its heavy plate mill Ilsenburger Grobblech GmbH, is the first supplier to be qualified, something, which has also been reinforced by third-party certification.

Today, tower production accounts for more than one-third of all wind-turbine-related CO_2 emissions. If all towers installed by the company in one year were exchanged with GreenerTowers, it would be the same as removing more than 466 000 cars from the roads in Europe for a year. This new CO_2-reduced tower will be available as an option for both onshore and offshore wind turbines for projects to be installed from 2024 onward.

The GreenerTower has already closed its first order. RWE and Siemens Gamesa have agreed to introduce 36 GreenerTowers at the 1000 MW Thor offshore wind power project in Denmark. In total, 72 SG 14-236 DD offshore wind turbines are planned to be installed starting in 2026. Sven Utermöhlen, CEO RWE Offshore Wind, said: "Offshore wind already has one of the lowest lifecycle carbon footprints of power generation technologies. At RWE we are fully committed to working towards circularity and net zero emissions. We are already testing the world's first recyclable wind turbine blades by Siemens Gamesa under real-life conditions."

By piloting the GreenerTower at our Thor offshore wind farm, RWE is now looking to take the lead in helping to significantly reduce the carbon footprint of wind turbines.

On average, 1.91 t of CO_2 is emitted during the manufacturing process for every tonne of steel. By setting a threshold of 0.7 t CO_2-equivalent emissions per tonne of steel, Siemens Gamesa says it "significantly" reduces the footprint of the largest component in terms of CO_2-equivalent emissions.

The use of green steel in its wind towers goes a long way to closing the loop in making its wind turbines completely green.

It certainly feeds into Siemens Energy's strategy of cutting emissions from its own operations. "Again, this is at the heart of what we're doing at Siemens Energy and the goals that we've set for ourselves. We look at Scope 1, Scope 2 and Scope 3 emissions. Every time we supply to the steel industry, if it's not green steel it adds to our Scope 3 emissions," said Sengupta. "So we are very actively engaged to reduce Scope 3 emissions, which means we are actively engaged to pursue the HDRI. So it not only helps our customers, it helps us as well. Ten years down the line, this needs to be more the norm rather than the exception."

He concluded: "Technology is important but perhaps even more important is the relationship with our customers. We have been working with Salzgitter to build the solution together, supporting them for the last 5-10 years. It's partnerships that make all of this come to life."

The new GreenerTower will ensure a CO_2 reduction of at least 63 per cent in the tower steel plates compared to conventional steel

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Siemens Energy rethinks wind business strategy as wind turbine woes bite

- Annual net loss projected at €4.5 billion
- Third quarter net loss of €2.9 billion

Junior Isles

Siemens Energy is reviewing the strategy of its wind subsidiary Siemens Gamesa in response to challenges at the business that led the German group to project an annual net loss of around €4.5 billion ($4.93 billion).

The forecast came as Siemens Energy reported a net loss of €2.9 billion for the third quarter and slashed its outlook for annual revenues. Executives had previously predicted that losses for 2023 would exceed last year's €712 million loss by a "low triple-digit-million" amount.

Last month the company reported that its third-quarter results were hit by €2.2 billion in charges at Siemens Gamesa, as a result of quality issues with some of its onshore platforms, as well as higher product costs and ramp-up difficulties in the offshore business.

Siemens Energy said that most of the quality problems are related to certain rotor blades and main bearings in the 4.X and 5.X onshore platforms. These are not installed in all turbines on the platforms, meaning that a limited number of the onshore turbines are affected.

The company said that the problems could be fixed during regular maintenance but admitted it "sold turbines too quickly that had not been sufficiently tested".

In June, the company said the issues would cost €1 billion to fix, with CEO Christian Bruch admitting faults were "more severe than I thought possible".

Analysts said the struggles at Siemens Gamesa are the result of a broader challenge across the renewable energy sector, which was facing rising costs and tough competition on pricing. Despite growing demand for clean energy, the sector has been battling with higher prices for materials, ongoing supply chain disruptions and strong competition from China.

The company also recorded charges of €600 million due to higher product costs in offshore projects already committed to contractually, and also challenges in the ramp-up of offshore activities, exacerbated by ongoing challenges in procurement and labour markets.

Because of the challenges, Siemens Energy is reviewing the current strategy in the wind business and will announce details at its Capital Markets Day in November.

The company, however, still remains confident it will manage to carry out a turnaround.

"Our third-quarter results demonstrate the challenges in turning around Siemens Gamesa. The strong performance of our other business areas gives me confidence in our company's ability to put businesses back on a strong footing," said Bruch.

"We believe more than ever in the potential of wind power," Bruch told reporters during a conference call.

Siemens Energy saw a jump in orders in the third quarter, with those at the Siemens Gamesa unit alone more than doubling year-on-year.

Vestas maintains full-year outlook

Danish wind turbine manufacturer Vestas Wind Systems A/S has kept its full-year outlook after reporting an improvement in its second-quarter results.

Revenue climbed 3.8 per cent from a year earlier, increasing to €3.43 billion ($3.75 billion), up from €3.3 billion in the same period last year, as a result of increased service activity and higher value of turbine deliveries. The increase was partially offset by lower MW delivered.

Earnings before interest and tax (EBIT) before special items were down €70 million, with EBIT margin before special items standing at -2 per cent, compared to -5.5 per cent in the same quarter of 2022.

The company said the margin was in line with expectations and the continued execution of older projects with lower margins in its backlog.

Order intake in the second quarter was 2333 MW, up 8 per cent on a year ago, with the onshore average price per MW inching up to €0.97 million from €0.96 million in the same period last year.

Vestas, however, returned to a quarterly loss, underlining the challenges facing the sector. It warned of supply chain issues and slow approvals for new wind power projects.

Henrik Andersen, Chief Executive of the Danish manufacturer, said supply chain disruptions were "easing off" but blockages would take several months to clear, while a lack of wind farm approvals was weighing on the industry.

Andersen said there had been "almost a slowdown" in approvals for new wind farms over the past few months, despite an increase in global government targets for clean energy. "We talk a lot about what we need more of, but we do so little about it," Andersen told the *Financial Times*.

"People talk about targets like they [are a] reality but it's not [the case] – in the past few months we have seen almost a slowdown in permitting rather than [an] increase.

Looking ahead, Andersen said the global business environment is expected to remain challenging throughout the remainder of the year.

"The first half of the year unfortunately also highlighted that permitting and regulatory uncertainty remain a key challenge to speed up the energy transition, and although supply chain disruptions are easing off, we expect disruptions to continue throughout the second half of the year," he said.

GE Vernova acquires Greenbird to accelerate GridOS

GE Vernova's Digital business has acquired Greenbird Integration Technology AS, a data integration platform company focused on utilities. The data integration platform will accelerate GE Vernova's GridOS , adding new capabilities for connecting systems and integrating data across the grid more easily and at scale. The financial terms of the acquisition were not disclosed.

GridOS is claimed to be the world's first software portfolio designed specifically for grid orchestration, adding new capabilities for connecting systems and integrating data across the grid more easily and at scale.

"Utilities have an urgent need to connect data from multiple sources to gain visibility and effectively automate their grid operations. Fragmented data is a major obstacle to modernising the grid and is holding the energy transition back," said Scott Reese, CEO of GE Vernova's Digital business. "The Greenbird acquisition brings the proven ability to connect multiple data sources and accelerates our vision for GridOS: that is making energy security a reality for many of the world's leading utilities. Data and AI are key to helping utilities run a reliable and resilient grid and this acquisition is a massive accelerant to making that vision a reality for utilities of all sizes."

The GridOS orchestration software platform and application suite enables secure and reliable grid operations while delivering the resiliency and flexibility needed by utilities worldwide. GridOS delivers these tools with the cloud service provider and system integrator partner ecosystem necessary to accelerate grid modernisation and the energy transition. The software portfolio uses a federated data fabric to pull together energy data, network modelling, and AI-driven analytics from across the grid.

The Greenbird acquisition will expand the capabilities of the data fabric, eliminating data silos to make it faster and easier to connect and aggregate energy data, reducing the time and expense of data integration projects.

This also better connects modern software such as Advanced Energy Management System (AEMS), Advanced Distribution Management Solutions (ADMS), and Distributed Energy Resource Management System (DERMS), creating new opportunities for grid automation.

"Having access to utility data in context gives grid operators an opportunity to better leverage AI for automation and potentially enables the grid to be self-describing and self-healing in the future," said Mahesh Sudhakaran, General Manager, Grid Software at GE Vernova's Digital business.

Data integration is also key to solving renewables connection challenges. Approximately 1350 GW of additional, mostly sustainable power capacity is waiting to be constructed and connected to the grid. This large-scale interconnection backlog results in wasted capacity and unutilised investment. Scenario planning and grid simulations can provide an opportunity to increase line capacity and drive deeper visibility into the impact of such assets on the grid, allowing capacity to be connected faster and helping to reduce hundreds of millions of dollars of traditional back-up generators. Such use cases require the integration of forecasting, simulation, historical grid OT, sensor, line, and inertia data.

Jera seeks investors to boost renewables

Jera, Japan's largest power company, is holding early talks with external investors over a capital injection to boost its investment in renewables.

Like other big power companies, Jera is under pressure to cut carbon emissions, amid increasing extreme weather caused by climate change, including in Japan. The company accounts for a third of power generation in the country – from burning LNG and to a lesser extent coal – and its CO_2 emissions make up about 10 per cent of the Japanese total.

Jera's Global Chief Executive Yukio Kani said the company required "huge investment" to expand in renewables and hydrogen, which are expected to become two important business lines in future, and that the company could not manage that with its existing balance sheet. "We need to ask a third party to inject equity to strengthen our balance sheet," he said.

Kani did not disclose how much Jera was looking to raise, or how much it wanted to invest in renewables.

The company is already expanding in this part of the market. Earlier this year, it agreed to buy Belgian offshore wind developer Parkwind for €1.55 billion. It is also jointly acquiring Tokyo-based Green Power Investment, one of Japan's leading renewable energy groups, with Japanese telecoms business NTT, in a deal worth $2 billion. Jera has set a target of 5 GW of renewable energy output by 2025 and reaching net zero CO_2 emissions by 2050.

Americas

Canadian 280 MW wind farm contract for Nordex

A contract for the delivery and commissioning of 49 N155/5.X turbines for the Forty Mile wind farm in Alberta, Canada has been awarded to the Nordex Group.

All turbines will be cold climate versions and will be delivered with a rated capacity of 5.7 MW and operated on 108 m steel towers.

The wind farm is scheduled to be commissioned in Q1 2025, and will have a combined capacity of 280 MW. It will be Acciona Energia's largest wind farm in North America.

GE substations for Brazil wind complex

GE Grid Solutions will supply two 500 kV air-insulated substations (AIS) for Brazilian renewables developer Casa dos Ventos' 756 MW Serra do Tigre wind complex located in the northeastern state of Rio Grande do Norte. The contract also includes the construction of a connection bay in neighbouring Paraiba state. This will include all the necessary high-voltage equipment, as well as the telecom, protection and control systems.

Asia-Pacific

Suzlon wins 31.5 MW wind project in India

Suzlon Group has won a contract to develop a 31.5 MW wind power project for Integrum Energy Infrastructure in India. Suzlon will install 15 units of its S120 - 140 m wind turbines with a Hybrid Lattice Tubular (HLT) tower, each with a rated capacity of 2.1 MW. The turbines will be installed in Maharashtra and Karnataka, India. The project is scheduled to be commissioned in May 2024.

Suzlon will supply, install, and commission the power plant. In addition, it will provide post-commissioning O&M services.

GE Vernova to upgrade China hydropower plant

Yangzte Power has awarded a contract to GE Vernova to upgrade the Xiangjiaba hydropower plant in China. The scope of work includes the design, manufacturing, delivery, installation, and commissioning of three sets of main shaft air supply pipes. The upgrade is expected to be completed in the first half of 2024.

The replacement of the air supply pipes will help improve the sealing effect, maintaining the efficiency of the 6.4 GW hydropower plant.

Roberta Galli, Hydropower Services Leader of GE Vernova, said: "This project builds on GE's and Yangtze Power's long-lasting relationship. China still has a huge potential to integrate more renewable and reliable energy into the grid and accelerate the energy transition in the country."

Nagaland to buy power from biomass plant

The government of the Indian state of Nagaland has signed a PPA with the IPP Hutah industries to buy electricity from its 10 MW biomass plant at AK Industrial Village in Ganeshnagar.

Aditya Pandit, CEO and CFO of Hutah Industries, said that the raw material for the bamboo-fired plant will be grown within the project area. He said the project will be completed within 24 months, and that 1500 acres of land had already been leased by the firm for 25 years.

Gas turbines for China's Greater Bay area

Two orders for four GE 6F.03 gas turbines for Yangjiang City, in the Guangdong-Hong Kong-Macao Greater Bay Area in China, have been placed with GE Vernova's Gas Power business.

The first order for two units was with Royal Golden Eagle Group (RGE)'s East Asia Power for its Yangjiang High-Tech Zone Natural Gas CHP Plant, for a LNG receiving terminal. Two units were purchased by Beijing Energy International for the Yangjiang Yangxi Natural Gas CHP project.

The four units will supply a combined capacity of 480 MW once operational, scheduled for early 2025.

China aims to achieve a carbon emissions peak by 2030 and carbon neutrality by 2060.

Europe

Vestas wins deal for Baltic Power offshore wind farm

Vestas has signed a conditional agreement to supply the wind turbines for the 1.2 GW Baltic Power offshore wind project on Poland.

In addition, NKT has been awarded a contract to supply export power cables for the 1.2 GW Baltic Power offshore wind farm in Poland. Baltic Power is a joint venture between Polish PKN Orlen and Canadian Northland Power.

The €120 million contract is for NKT to supply offshore export power cables for the offshore wind farm to be built in the Baltic Sea, 23 km off the Polish coast. NKT said it would execute the order in a consortium with two partners, but did not disclose who the partners are.

The Baltic Power offshore wind farm will be built in the waters off Choczewo and Łeba, where 76 Vestas V236-15.0 MW wind turbines will be installed. The wind farm is scheduled to enter construction in 2024 and commercial operation in 2026.

Vestas secures Spanish wind turbine order

Sinia Renovables has awarded an order for a 50 MW wind project situated in the northwestern region of Spain to Vestas.

The contract is to supply 11 V136-4.5 MW wind turbines. In addition, Vestas will provide a 25-year Active Output Management 4000 (AOM 4000) service agreement. Turbine delivery is scheduled for Q2 2024.

Xavier Gasquez, Managing Director of Sinia Renovables, said: "It is critical for Sinia to work with partners in our effort to keep deepening the decarbonisation of the Spanish economy."

Schneider to upgrade Serbia's MV network

Schneider Electric has won a contract to supply medium voltage (MV) equipment and grid management software to upgrade Serbia's electrical distribution network. The project is to improve network reliability and will improve the quality of electricity supply, strengthening the service provided by Serbia's distribution system operator Elektrodistribucija Srbije (EDS).

Greece receives 3.3 GW BESS bids

Greece's first standalone battery energy storage system (BESS) tender has been heavily oversubscribed, attracting offers totalling 3.3 GW against a target of 400 MW.

A total of some 93 proposals were filed with the energy regulatory authority RAE. Among the participants in the round are Greek firms Helleniq Energy, PPC Renewables and Mytilineos.

The selected developers will receive a grant of up to €200 000 per MW to install the proposed BESS capacity. The winning projects should have an individual capacity not higher than 100 MW and should be commissioned by the end of 2025. They will be connected to the country's transmission grid.

Hitachi Energy to supply UK HVDC link

Hitachi Energy has been selected as preferred technology provider by SSEN Transmission and National Grid to supply five HVDC converter stations to interconnect the Scottish and English power grids.

Hitachi Energy will supply its voltage source converter (VSC) converter stations, which convert AC to DC for efficient, long-distance transmission and DC to AC, where the electricity is returned to the grid.

The first two projects under the framework agreement between Arnish-Beauly and Spittal-Peterhead have already been defined. The Eastern Green Link 2 will consist of two 525 kV bipole VSC converter stations connected by 440 km of subsea cable and 70 km of underground cable, making it the longest HVDC link in the UK.

The three additional projects are flexible in location, and to be defined as large-scale studies are finalised. The HVDC links are expected to enter operation in 2030 and onwards.

Solar plus storage plant at German lignite mine

RWE has started construction at a new 8.4 MW solar PV project at its Hambach lignite mine in the German state of North Rhine-Westphalia. The new solar project, the Neuland Solar Farm, will soon be generating power, with RWE expecting to complete construction work and begin commercial operations by the end of 2023.

The solar project will use bifacial solar panels, and be joined by a battery energy storage system (BESS). The BESS will have a two-hour charge and discharge cycle, and a power capacity of 8 MWh.

Katja Wünschel, CEO of RWE Renewables Europe & Australia, said: "This is the fourth large solar project we are launching within the Rhenish mining district within a very short period of time, again in combination with a storage system."

International

Turkish 189 MW wind order for Nordex

Ronesans Holding of Turkiye has awarded a contract to Nordex to equip three projects with a combined capacity of 189 MW.

The order is for the supply of 27 N163/6.X turbines, which will be mounted on 113 m steel towers. It also includes a ten-year turbine servicing contract.

The largest project is the 12-turbine Sagilusagi site in the province of Malatya in Eastern Anatolia, which will have a total capacity of 84 MW. Nordex will also deliver eight turbines for the 56 MW Osmancik project in Corum and seven turbines for the 49 MW Kayalar site in Sivas.

Heitkamp Industrial Solutions, a subsidiary of Ronesans Enerji, is the EPC contractor for the three facilities. Emre Hatem, Vice President of the board of Ronesans Enerji, said: "With these three new projects with Nordex, our total installed capacity will increase to 355 MW. We aim to continue growing with a 100 per cent renewable energy portfolio and aspire to become one of Turkiye's top three green energy companies."

Hyundai wins power line order from Saudi Arabia

Hyundai Engineering & Construction has won a $145 million contract to lay HVDC power transmission lines in Saudi Arabia.

The contract covers the construction of a 525 kV, 605 km transmission line between Saudi Arabia's newly developed city of Neom and the country's western port of Yanbu. Hyundai said it will also construct 450 transmission towers under the turnkey project scheduled for completion in July 2027.

Hyundai will manage the entire process, from design and procurement to construction.

Maersk in talks on Egyptian wind farm sale

Denmark's Maersk Group is in talks to potentially acquire half of the Egyptian state-owned Zaafarana's 545 MW wind farms in the Red Sea Governorate, Egypt. Maersk will use the energy generated by the wind farms to produce green fuels such as hydrogen.

If acquisition plans are successful, Maersk will acquire assets producing 270 MW in eight projects of the Zaafarana farm.

The Egyptian government currently owns 50 per cent of the Zaafarana wind farm, the rest being owned by multiple international entities. The wind farm was funded through multiple investments and loans from Germany, Denmark, Japan, and Spain.

Greenland hydropower plant to be expanded

AFRY, NIRAS, and Inuplan have been awarded a contract to expand the Buksefjorden hydropower plant, Greenland's largest hydropower plant, which supplies Nuuk, the country's capital.

The planned expansion will consist of two new units, a new cavern and tunnel systems. It will also connect an additional lake to the plant via a 16 km transfer tunnel connecting the current intake at Lake Kangerluarssunnguup Tasersua to Lake Isortuarsuup Tasia, increasing the available volume of water from 352 to 1248 million m^3. With this expansion, the production of clean energy will be enhanced from the current maximum of 255 GWh annually up to a future capacity of potentially 660 GWh. The expansion is scheduled for completion by 2029.

The project is owned by the Greenlandic state company NunaGreen in partnership with the national energy utility Nukissiorfiit, which will operate the facility once it is in operation.

Masdar to develop solar power plants in Iraq

Masdar of Abu Dhabi will build solar power plants in multiple governorates across Iraq. These plants will be built in the regions of Maysan, Dhi Qar, Anbar, and Kirkuk.

Ziyad Ali Fadel, Iraq's Minister of Electricity, said that the Iraq Government plans to diversify energy sources and reduce dependence on gas and fossil fuels to address environmental issues and global warming.

Iraq is looking to expand its electricity grid and has recently invested in a 2000 MW power plant located in Basra.

Hydrogen

China's hydrogen plan takes on ambitious targets stymied mostly by cost

China's energy demand and usage is a hot topic in global markets and it will remain so, even in the midst of an energy transition. But the government last March introduced its first-ever long-term plan for hydrogen, and many companies and regions in the vast country have become inspired to press ahead with hydrogen projects that might exceed the next decade's demand.

Gary Lakes

The Chinese government in March this year released its first-ever long-term plan for hydrogen. Covering the period from 2021 to 2035, the plan outlines developing a domestic industry, mastering the technologies required for producing and using hydrogen, and creating the manufacturing facilities that the new industry requires.

Behind it all is China's desire to address the issue of it being one of the world's largest emitters of greenhouse gases. Beijing has committed itself to being net zero by 2060, 10 years later than most other nations, but it is not waiting to begin decarbonising its economy. Hydrogen is one of six industries identified in the 14th Five-Year Plan (which covers 2021-2025), as an industry of the future.

China is currently the largest producer of hydrogen, making about 33 million tons annually, although most of it is sourced from fossil fuels and used as feedstock in refineries and chemical plants. The country is a large producer of electrolysers, which use renewable energy to separate water into oxygen and hydrogen – resulting in green hydrogen. Low carbon hydrogen, blue hydrogen and other colours of the gas are produced using electricity generated by burning fossil fuels.

One of the problems that China and other countries face is reducing the cost of producing renewable energy.

The China Hydrogen Alliance estimates that China's hydrogen demand will reach 35 million tons in 2030, about five per cent of the country's energy supply, and 60 million tons in 2050, which would amount to about 10 per cent. Green hydrogen output could reach 100 million tons by 2060, according to the Alliance. The group has estimated the value of China's hydrogen industry at some $153 billion by 2025.

The plan devised by the government sees as much as 200 000 tons of green hydrogen – from renewable energy sources – produced by 2025, along with as many as 50 000 hydrogen-fuelled vehicles on the road by that year. Some reports on the subject have said that the hydrogen production target is low and that China will reach the 100 000-200 000 mark before 2025.

The country is already the third-largest fuel cell electric vehicles market and the first for fuel cell trucks and buses. Using green hydrogen in vehicles and industry could reduce CO_2 emissions by as much as 2 million tons annually by 2025. More hydrogen use could enable China to hit peak carbon emissions before 2030 and net zero by 2060, the government estimates.

The Chinese government knows that it has a number of technological challenges to overcome during the course of building a hydrogen economy. Boosting renewable energy capacity is one. Plans are underway to double renewable power generation to 1200 GW by 2030. Other issues include reducing the costs for extracting, storing, transporting and delivering hydrogen to customers.

But despite the technological glitches, China has a potentially huge market for hydrogen and government support is solid. A set of guidelines were recently released by the government to encourage the rapid development of the industry.

There are at this time some 35 green hydrogen projects in the planning stage, and in July, a 10 000 ton per year green hydrogen refinery began operating. Its output is being sent to nearby refineries to replace natural gas as a fuel source.

While the central government has announced its plans for hydrogen projects, provincial and municipal regions have announced their own plans to engage in hydrogen production, a factor that is expected to feed significant production growth in the years ahead and possibly risk overcapacity.

One media source reported that the combined green hydrogen production targets set by the provinces of Inner Mongolia, Qinghai and Gansu add up to 740 000 tons annually by 2025. Thirteen provinces and cities expect to have 111 000 hydrogen-fuelled electric vehicles on the road by 2025. Yet the cost for hydrogen-fuelled electric vehicles needs to fall considerably before they become genuinely commercial.

Much of the attention focused on China's energy focuses on coal or natural gas because it requires such huge amounts and that fuel is what China – and much of the rest of the world – is geared up to burn for power generation. But the Chinese plan signals that it intends to address the challenges facing hydrogen seriously, which can only show positively in China, the region and globally in the years ahead.

Gas

Israel to hike gas exports to Egypt, expanding efforts for East Med cooperation

Following lengthy discussions, Israel is to increase its natural gas shipments to Egypt. The decision comes after requests by Cairo and clearance by Israeli officials who want to make sure that more exports will not someday leave Israel with insufficient reserves.

Gary Lakes

Israeli Energy Minister Israel Katz announced last month that Israel will soon increase its natural gas exports from the offshore Tamar gas field to Egypt. Israel is already exporting gas to Egypt through the East Mediterranean Gas (EMG) pipeline, which connects the two countries along the Mediterranean coastline.

In an atmosphere where countries and companies are looking to secure the future supply of natural gas, Israel appears keen to make the most of its offshore gas reserves, which amount to around 1 trillion cubic metres. But Israel has been concerned about its own future security of supply. Some officials had argued that boosting exports run the risk of someday leaving Israel short on energy.

However, Katz said he okayed the expansion of production at the Tamar field after receiving recommendations from Petroleum Commissioner Chen Bar Yosef and after ensuring that there are sufficient gas supplies for Israel and that energy security is sound.

Katz in recent weeks has been publicly advocating an increase in gas exports. Besides Egypt, Israel supplies some gas to Jordan, and along with Egypt, Cyprus and Greece, it has been in discussions on how to best move East Mediterranean gas supplies to Europe, which the four countries consider to be the best and closest market.

"The step will increase the state's revenues and strengthen the diplomatic relationship between Israel and Egypt," he told Israeli media.

In early August while visiting the offshore platform for the Leviathan gas field 150 km off the coast, Katz said: "Our ability to export gas, in a controlled manner, as I've said, is a great diplomatic weapon that strengthens Israel's position in the region, and the world. If we take the economic aspect… and the diplomatic benefit for strengthening Israel's position, surely we need to make the decision to increase the export of gas, according to the quantity needed."

The Tamar gas field first came onstream in March 2013 under the operatorship of Houston-based Noble Energy. Following the purchase of Noble Energy by Chevron in October 2022, Tamar, Leviathan, and other assets owned by Noble are now being operated by Chevron, including the Aphrodite field offshore Cyprus.

Chevron has recently delivered a development plan for Aphrodite to the Cypriot government. It has yet to be revealed how Chevron proposes to develop Aphrodite, but the proposal is expected to include some means of transferring Cypriot gas to Egypt by subsea pipeline. The proposal might include cooperation between Chevron's Israeli assets or possibly with other major energy companies working in Egypt.

For its part, Egypt is facing a gas shortage, in large part due to production problems at its huge Zohr gas field, which is the main source of gas from Egypt and which lies a short distance from both the Aphrodite and Leviathan fields. And also, by the rising demand for energy from its 105 million population in the midst of sweltering summer heat.

Egypt also has two LNG export facilities with sales contracts to maintain. A big part of the thinking in the East Mediterranean focuses on sending Israeli (including Leviathan gas) and Cypriot gas to Egypt for re-export as LNG to Europe. Doing so would also provide a degree of economic and political security to the East Med states.

In 2022, Israel and Egypt signed a memorandum of understanding (MOU) with the European Union (Cyprus is an EU member) regarding the future supply of East Mediterranean gas to Europe.

Israel began to export Tamar gas to Egypt in 2017 and Leviathan gas in 2020. During 2022, Egypt imported 6.27 billion cubic metres (bcm) of Israeli gas and much of it has been used to meet the growing domestic need. According to Israeli media, Egyptian imports of Israeli gas will increase by 4 bcm/year once the new scenario is put into place.

According to Katz, Israeli gas exports to Egypt will increase to a total of 38.7 bcm over the next 11 years and output from Tamar will increase from the current 11 bcm/year to around 17 bcm/year, a large portion of which will be available for Israeli consumption. According to media reports, Chevron and its partners in Leviathan have requested an export license of 7 bcm/year for 20 years and an overall export quota of 175 bcm for a 25-year period. A plan for this stage of development also has yet to be revealed.

Israel has placed restrictions on the amount of gas that can be exported to around 40 per cent of total reserves. Together, Tamar and Leviathan have gas reserves amounting to around 31 trillion cubic feet (tcf), i.e. approximately 875 bcm.

For more information, please contact:

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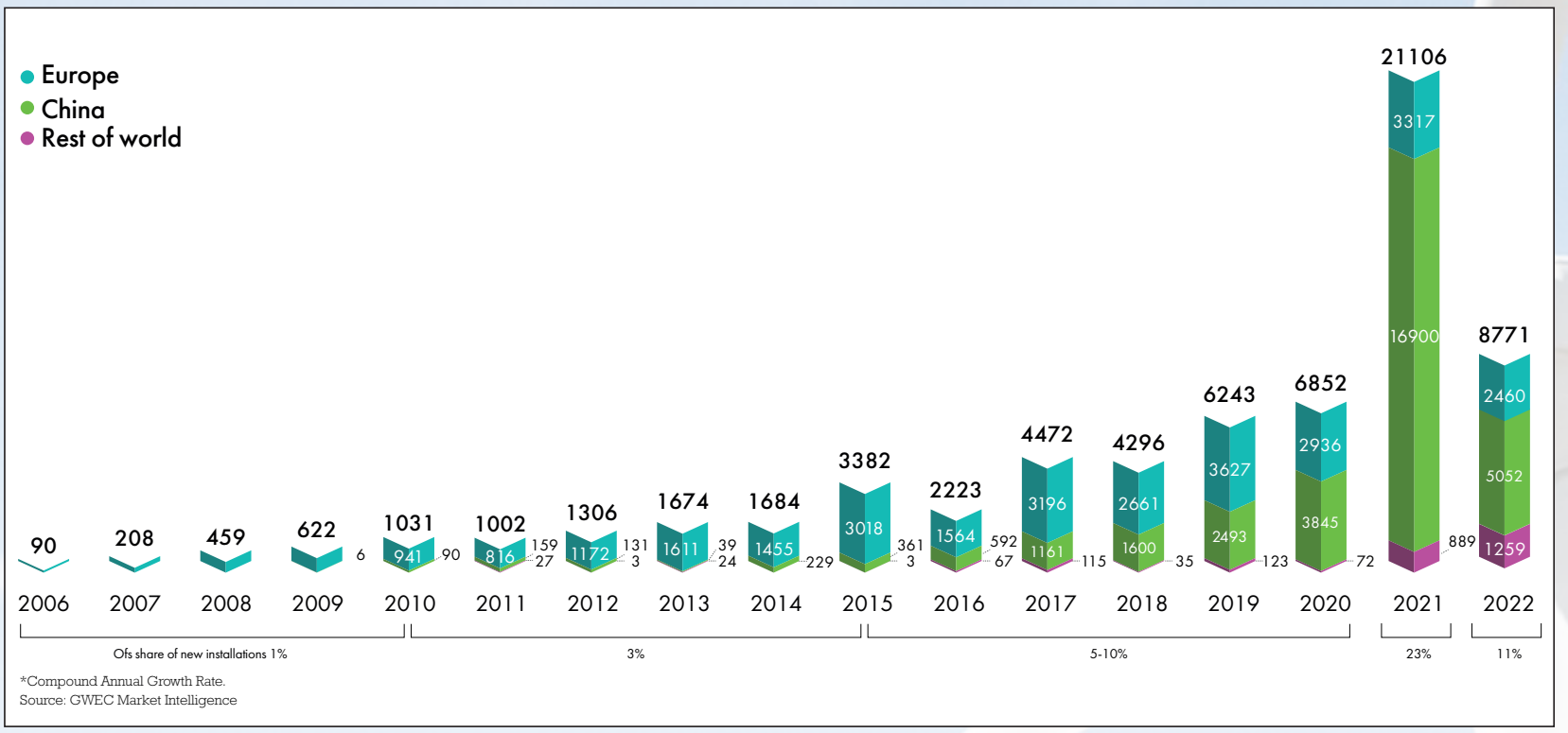
New offshore wind installations (MW)

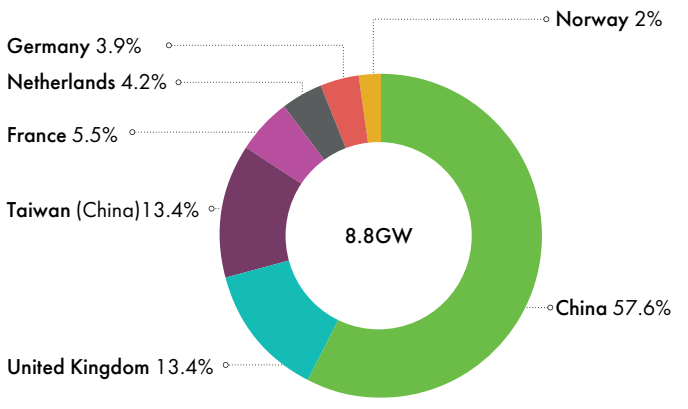


*Compound Annual Growth Rate.
Source: GWEC Market Intelligence

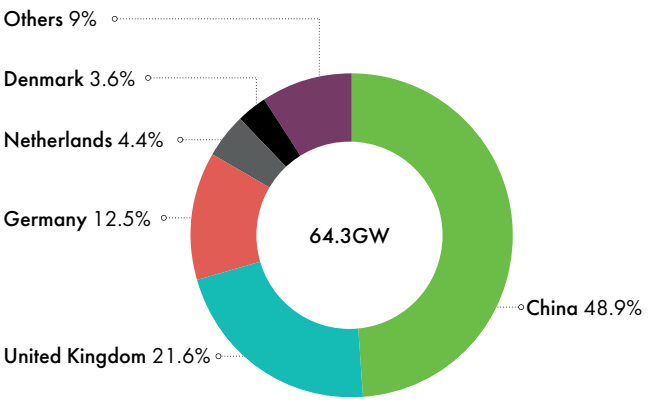
Offshore wind installations by market

Market Status 2022

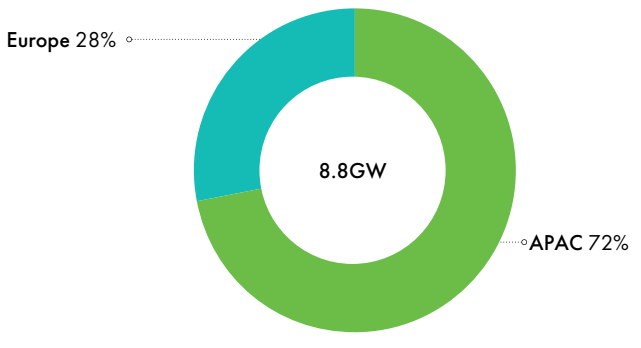
New offshore wind installations by market



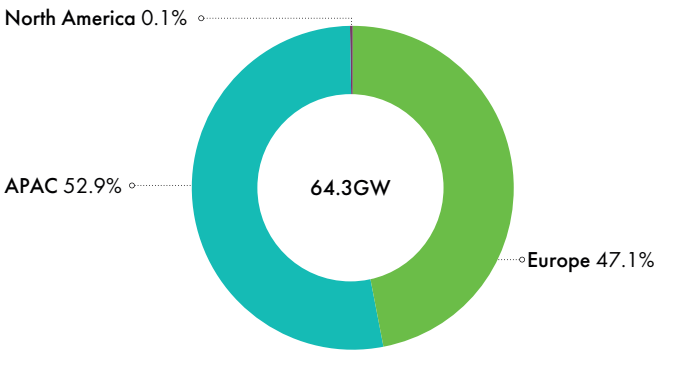
Total offshore wind installations by market



New offshore wind installations by region



Total offshore wind installations by region



Source: GWEC Market Intelligence, June 2023

Source: GWEC | GLOBAL OFFSHORE WIND REPORT 2023

Accelerating UK electrification

A flexible, forward-thinking approach must be taken to accommodate the UK's unprecedented soar in demand for renewable electricity Vattenfall Networks' **Suzanna Lashford**, explains.

Significant progress has been made in shifting towards clean power in the UK, with the National Grid's Electricity System Operator (ESO) reporting that 46 per cent of Britain's electricity came from zero carbon sources in April 2023. But as demand for clean energy grows, the UK's existing power infrastructure and one directional energy model grows increasingly obsolete.

The UK has consistently broken records for its renewable energy uptake since 2020, with the Energy and Climate Intelligence Unit (ECIU) noting that British-based renewable energy sources have already overtaken gas as the primary source of electricity, based on data taken between October 2022 and January 2023. But as demand for renewable electricity continues to grow, so does the pressure to re-evaluate the existing energy infrastructure to ensure the UK's grid can provide a reliable network that is capable of keeping up with supply and demand.

While the UK has made leaps and bounds in stimulating investment in generation from renewables, there is still a way to go in terms of expanding the transmission systems, including pylons, overhead lines, cables, and substations. Very few transmission networks have been built since the 90s, and developments will need to be completed at an unprecedented scale in order to support the increase in the number of renewable projects.

Analysis from the Department for Energy Security and Net Zero (DESNZ) demonstrates that the necessary upgrades will take around 14 years, during which time applications for grid connections will soar. The National Grid has warned that those looking to secure their connection in England and Wales will have to wait in line behind 600 other projects comprising of 176 GW, in a backlog extending more than a decade into the future – and all fighting for just 64 GW of connected capacity.

These limitations are delaying billions of pounds of private investment, which play an essential factor in delivering the UK government's targets for renewable energy generation. The issue is expected to spiral over the course of the next few decades, with the UK's electricity demand expected to double or even triple by 2050.

As it stands, grid constraints – coupled with a lack of investment in transmission system capacity and grid modernisation – mean the UK is producing more electricity from wind power than it can use. Consequently, the National Grid has introduced curtailment costs, through which wind generators are paid to switch off rather than overload the grid at times of high wind speed. Energy tech company Axle Energy reported that £215 million ($270.5 million) was paid to wind generators to power down turbines in 2022 and a further £717 million was spent on switching on gas turbines nearer to demand.

As rapid investment in wind capacity continues to soar, the National Grid ESO warns that annual constraint costs could rise to as much as £2.5 billion over the next decade before the necessary upgrades to the grid are put in place – costs that will likely be added to UK consumer bills. Following outrage from UK businesses, changes have been implemented to shorten delay times, such as making it easier for projects to leave the queue without penalty. New methods also include introducing a two-stage connection process and tighter queue management, to help remove 'zombie' projects (those which are taking up space better used by projects that are ready). But it will be a long time before the results of these changes come into fruition, and many developers are still (and will continue to be) faced with critical delays that leave their projects on hold whilst they wait for the grid to catch up.

In areas with weak supply, large batteries can be used to increase capacity at peak times to reduce curtailment costs (for shutting down wind turbines), storing excess clean energy for later use and ensuring none is wasted. A recent report from Nick Winser CBE, the UK's first Electricity Networks Commissioner, sets out a 14-step plan to help bolster the country's energy security and ensure it is taking full advantage of its position as a world leader in renewables. Step two on his list is the huge potential for energy storage systems like batteries, which he emphasises will also lessen the intensity of the need for rapid grid modernisation. The report stated:

"Demand flexibility and smart investment and operation of energy storage facilities can reduce the need for new transmission investment. Urgent development of zonal flexibility markets and new, more encouraging, planning and operation rules will reduce transmission investment costs and provide valuable opportunities to deploy more renewables earlier."

A prime example of how energy storage systems can be utilised can be found in Uppsala, Sweden; here, energy and infrastructure specialist Vattenfall is currently spearheading the development of what will be the Nordic region's largest battery storage facility. The area is equivalent to about half a football pitch and has enough capacity to power Uppsala municipality's entire street lighting system. Acting as a gigantic "power bank", it can be charged up when there is no demand for electricity and discharged when there is a high level of demand.

Lashford: Grid constraints, coupled with a lack of investment in transmission capacity and grid modernisation, mean the UK is producing more electricity from wind power than it can use

This June, James Carter, UK Head of Energy and Natural Resources at DLA Piper, also emphasised that the role that energy storage facilities play in the UK's energised future "cannot be underestimated", and the potential for long-duration storage to contribute towards the UK's net-zero goal.

"It is the critical support structure which delivers stability and security of supply in a volatile market," Carter commented. "It can be seen as a keystone in the development of an energy system which allows the UK to move at the pace required to a cleaner, greener economy."

Another idea to increase investment and speed up the development of the UK's grid could be to enable Independent Distribution Network Operators (IDNO) to take on more on some of the 'non-contestable works'. Currently, IDNOs are only allowed to undertake 'contestable works', which include works from the point of connection with the existing distribution network, up to the point of demand or generation. Non-contestable works, on the other hand, are works on the existing distribution network up to the point of connection, which are currently only under the remit of Distribution Network Operators (DNO) or their appointed agents (ICPs).

Non-contestable works typically include the elements of the connection which interface with the DNO's network, i.e., determining the point of connection to the distribution system; designing 'upstream' grid reinforcement works associated with a new connection, and commissioning and connecting new assets to the distribution system. If IDNO's were to become more involved in non-contestable works, it would reduce pressure on the DNOs and allow them to focus more on upgrading weak spots in their networks. UKPN's RIIO-ED2 business plan states:

"We have seen a significant volume of connections work, delivered increasingly, by Independent Connection Provider's (ICPs) and IDNOs. But we believe we need to go further, and our customers agree. Facilitating a competitive connections market and the drive towards net zero are two strategic goals which support one another."

So, there is definitely interest from the DNOs in using IDNOs and ICPs to support upgrading the UK's grid.

Creating a future-proof net zero roadmap relies on a thorough understanding of the energy landscape, the current transmission delivery process, and potential areas for improvement. As this specialist knowledge is not typically at the purview of business owners, those looking to kickstart their journey are advised to seek support from an energy expert who understands the realities of delivery very well.

If your business is likely to need more electrical power over the next few decades to meet net zero or electrification goals, for example, then partnering with an IDNO to upgrade your grid connection makes obvious sense. These Ofgem regulated and customer-focused businesses work alongside ICP's to reserve grid capacity for free on behalf of their clients. IDNO's also contribute to the costs of designing and building an electrical network through an Asset Adoption Value (AAV) payment, which can significantly reduce the developer's total capital cost.

To support UK businesses in effectively bringing their net zero targets into fruition, Vattenfall has also recently developed a new model to offer a straightforward and hassle-free approach to transitioning to renewable energy, including solar and battery storage systems.

The energy specialist designs a bespoke plan for its clients, and then installs, operates and maintains any high voltage infrastructure and energy systems on their behalf – all capital expenditure-free. The extended energy service is specifically tailored to those who are ready to embrace the net-zero transition, but who lack the capacity to kickstart their journey, either due to lack of industry knowledge or funding.

Combined with recent reforms set out by the National Grid to help shorten delays in securing a grid connection, the above steps will be central to ensuring the UK achieves its target of decarbonising the country's power system in time for its ambitious 2035 deadline.

Suzanna Lashford is Manager of Business Development at Vattenfall Networks.

A prime example of how energy storage systems can be utilised can be found in Uppsala, Sweden

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Powering the future with Altris Prussian White

Amid the global shift towards sustainable energy solutions, Swedish sodium-ion battery developer Altris has developed a pure Prussian White cathode material with a capacity of 160 mAh/g – making it the highest capacity declared to date. Altris' **Björn Mårlid** discusses this important milestone.

Climate change is the biggest challenge of our time. In the transition from a society built on fossil fuels to electrification and clean energy sources, batteries play an important part. Besides powering our smartphones and computers and rapidly replacing diesel and petrol in vehicles, energy storage is crucial in the clean energy systems of the future. Batteries are essential for storing renewable energy so it can be used not only when it is produced but when it is needed – thereby maximising its potential.

Therefore, it should come as no surprise that global demand for lithium-ion batteries is projected to experience a 27 per cent annual growth between 2022 and 2030, surging from 700 GWh to 4.7 TWh. This development is propelled by regulations like Europe's 'Fit for 55' programme and the US Inflation Reduction Act, as well as significant customer interest in greener technologies.

As positive as the transition towards electrification and a larger share of renewable energy sources in the energy mix is, it comes with its own set of challenges. The main one is the lack of readily available raw materials – particularly refined lithium, cobalt and nickel – to produce enough lithium-ion batteries to cover demand.

To fill this shortfall, hundreds of new battery technologies and chemistries are invented in labs around the world every year. The sodium-ion chemistry has emerged as the most promising complement to lithium-ion.

Just like for lithium-ion, there are several sodium-ion chemistries. The main families are Layered Transition Metal Oxides, Polyanion Compounds and Prussian Blue Analogues (PBA). Out of these, it is only Prussian White, which belongs to the PBA family, that is solely being built on widely available, conflict-free and easy to recycle raw minerals. This ultimately makes Prussian White sodium-ion batteries the most sustainable of them all.

Compared to lithium-ion batteries, sodium-ion batteries have better safety characteristics and similar power delivery characteristics, at a lower cost but also a somewhat lower energy density. As such, sodium-ion batteries require a slightly larger volume to deliver the corresponding density.

Sodium-ion batteries are not a replacement for the widely used lithium-ion chemistries, but a complement. By developing Prussian White sodium-ion batteries with abundant materials and high energy density, we can preserve the scarce minerals for applications where exceptionally high energy density is required, like aeroplanes, cell phones or computers.

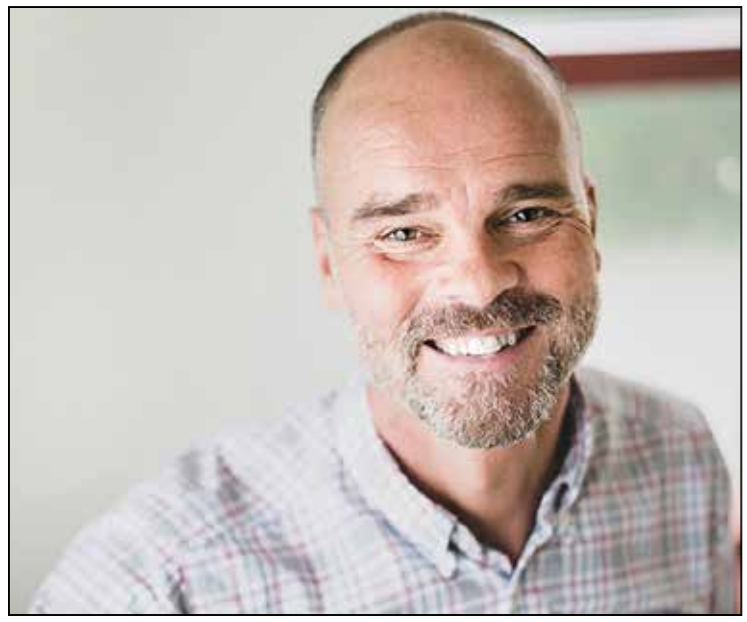
One of the first to discover the potential of sodium-ion battery technology was Nobel Prize-awarded scientist John B. Goodenough and colleagues. Although Goodenough is widely recognised as one of the fathers of the lithium-ion battery, his initial research was met with scepticism. A longer-lasting, faster-charging and safer battery chemistry simply seemed too good to be true.

However, Goodenough's research sparked the interest of three scientists at the Ångström Laboratory of Uppsala University in Sweden. As part of his master thesis, then student Ronnie Mogensen, today Chief Scientist at Altris, teamed up with his supervisor, Associate Professor Reza Younesi, and material chemistry expert, Associate Professor William Brant, to take Goodenough's research and build it into something real.

Together, the trio invented a sodium-ion cathode material that they later named Altris Prussian White. In 2017, a couple of years and a dissertation later, Ronnie, Reza and William founded Altris to excel their development with Altris Prussian White and sodium-ion battery technology.

The founders saw tremendous potential in developing a high capacity, pure sodium-ion cathode material. And their different areas of expertise turned out to be a perfect match, resulting in Altris Prussian White. Since then, the focus has been on advancing our patented cathode and battery technology to achieve the highest energy density possible, and commercialise the innovation.

Today, Altris stands at the forefront of sodium-ion battery development, dedicated to taking its innovations from conception to commercialisation. The company offers cathodes, electrolytes, battery cells, and blueprints to create sodium-ion batteries, primarily targeting customers within grid storage, commercial transportation such as buses, heavy trucks and boats, and personal transportation.



Mårlid is confident of achieving 160 Wh/kg and beyond in the near future

Altris' sodium-ion batteries exhibit exceptional performance in terms of extended lifespan, flexible operating temperatures, and safety. They are sustainable and readily recyclable, crafted from cost-effective and abundant materials: salt, wood, iron and air. Moreover, they boast an energy density comparable to the widely used lithium-ion chemistry LFP.

As part of Altris' commercialisation journey, battery industry, I was appointed CEO earlier this year, bringing more than 20 years of experience from, among other things, holding various positions at French battery developer SAFT.

Since the start, achieving real impact has always been Altris' guiding star. This core principle is key. By developing the next generation of batteries, we contribute to a more sustainable and electrified world.

Because of our achievements, Altris has gained the trust of the well-renowned actors Northvolt and Innoenergy who invested in a Series A financing in 2022 and a bridge financing with a 60 per cent oversubscription in 2023. The company is also preparing for a Series B financing later this year.

Energy density is one of the main areas of improvement for sodium-ion technology. To enhance the energy density in a battery, a key factor is to have high capacity in the cathode material. As such, Altris reached a significant milestone earlier this summer when it introduced a pure Prussian White cathode material with a capacity of 160 mAh/g.

This is the highest capacity in a completely pure Prussian White material declared to date – meaning a material that does not contain any conflict minerals or toxic elements to boost performance. The achieved capacity constitutes almost 95 per cent of the theoretical capacity of Prussian White, which is 172 mAh/g. The secret behind this achievement lies in an almost defect-free crystalline structure, a very high sodiation of close to two Na-ions per crystal unit cell and an optimised particle size in the low micron range.

Following development of the Prussian White cathode, earlier this year, Altris also measured its highest energy density to date in a commercial-sized sodium-ion battery cell, amounting to 150 Wh/kg. This makes the battery cell commercially viable for a wide range of storage applications, including grid energy storage connected to renewable energy production.

With our latest achievement, we have placed ourselves at the very forefront of sodium-ion battery development. The exceptional cathode capacity has enabled us to increase the energy density of our sodium-ion battery cells. But this is only the beginning. We are confident of achieving 160 Wh/kg and beyond in the near future.

Having proven its technology and gained the trust of industry leaders, Altris' next step is to scale up production. Expectations for a successful commercialisation are high and the company is already in dialogue with several prospective customers and partners within an array of different industries.

In the coming years, our focus is to continue to prove the technology and scale up fast enough to be able to respond to and serve the quickly expanding market – all while staying ahead in this highly competitive industry. It will not be easy, but I am confident that we will make it.

Björn Mårlid is CEO of Swedish sodium-ion battery developer Altris.

Altris' Prussian White has an almost defect-free crystalline structure

Junior Isles

Time for some green tea

Perhaps it should have come as no surprise that a meeting of environment and climate ministers in Chennai, India, ended in much the same way as a gathering of energy ministers in Goa just six days earlier.

In Goa, energy ministers were accused of serving up "very weak tea" as they failed to set strong goals and implementation plans to tackle climate change. It would be no exaggeration to say that that tea has now gone cold. Like the meeting in Goa, discussions in Chennai wrapped up without consensus on the global transition away from fossil fuels.

And with the UN's COP28 climate summit less than three months away, the rift between nations on making real and concrete commitments to avert the climate crisis seems deeper than ever.

After three days of meetings the Group of 20 (19 major nations plus the EU) remained divided on calls, led by developed nations, for the emission of greenhouse gases to peak by 2025 and reduce them by 60 per cent by 2035 over 2019 levels. Members could not agree on depleting carbon budgets, historical emissions, net zero goals and the issue of financing to support developing countries.

The demands were opposed by developing countries that said the mitigation targets would limit their ability to develop infrastructure and grow.

Jennifer Morgan, Germany's State Secretary and Special Envoy for Climate Action said that progress was "blocked by a small group of countries".

According to several people familiar with the talks, China obstructed the climate negotiations by refusing to debate crucial issues such as greenhouse gas emissions targets. Speaking to the *Financial Times*, one person said: "I've never seen such wrecking tactics employed at a multilateral meeting before." Another person familiar with the talks described the Chinese negotiator as a "one-man wrecking ball".

Another participant involved in the discussions described China's stance, which was backed by Saudi Arabia, as "stunning" and "increasingly obstructive". They added that if the countries impeding the talks were not "willing to shift, then the world has a real problem".

Discussions with China, Saudi Arabia and Russia were described as "complicated", by French Ecological Transition Minister Christophe Bechu. He told the Agence France-Presse news agency after the meeting that he was "very disappointed" with the outcome. "Records of temperatures, catastrophes, giant fires, and we are not able to reach an agreement on the peaking [of] emissions by 2025," he said.

The European Union's Environment Commissioner also criticised the outcome of the meeting. In his closing remarks, Virginijus Sinkevicius said: "At the end of our meeting today, is the glass half full or half empty? It is certainly empty when we look at where we stand on G20 commitments to address climate change – we simply are nowhere."

He added: "We were asked to make bold choices, to demonstrate courage, commitment and leadership, but we collectively failed to achieve that."

Sinkevicius also noted that some delegations had even tried to walk back previous climate pledges – a position he said Europe could not accept. "We cannot be driven by the lowest common denominator or by narrow national interests. We cannot allow the pace of change to be set by the slowest movers in the room," he told fellow ministers.

China and Saudi Arabia's position makes an agreement to ending fossil fuel use and setting implementation plans for tripling deployed renewable energy capacity worldwide by 2030 renewable energy look increasingly unlikely

China rejected calls for economy-wide targets to reduce total CO_2 emissions by almost half by 2030, as well as an agreement for global emissions to peak by 2025. These targets are intended to limit global warming to 1.5°C above pre-industrial levels.

Responding to the accusations of obstructing discussions, Beijing said the claims are "completely inconsistent with the facts". The foreign ministry said in a statement it "regrets" the failure to reach an agreement at the meetings, which was caused by "geopolitical issues" brought up by other countries "for no reason". It said the G20 should build political consensus among members and "fully respect the different development stages and national conditions of countries".

The Chennai meeting can only be judged as another dismal failure. The G20 could only acknowledge the obvious: that measures to address climate change are inadequate. There were no new pledges or joint communiqué, which is released when there is unanimous agreement among member nations on all issues. Instead, there was simply an outcome statement that dismissed the current measures to address climate change as "insufficient".

This document will be submitted to the Leaders for their consideration to be annexed to the G20 New Delhi Leader's Declaration 2023 when they meet September 9-10.

As the clock counts down to COP28 at the start of December, these ministerial and country leaders meetings should see nations inching ever closer to the agreements that are essential if the Dubai climate summit is to be deemed a success.

The G20 nations are responsible for about 80 per cent of global emissions and China remains the world's biggest emitter of greenhouse gas.

Beijing's co-operation at COP28 is therefore critical in reaching agreement on issues such as a global emissions stocktake and a fund for loss and damage resulting from climate change. To its credit, China is developing renewable energy rapidly and its emissions are lower than those of the US on a per-capita basis.

Yet the apparent hardening of its stance at the negotiations in Chennai does not bode well for upcoming talks and the urgent need to address the increasing global temperature rise. As it stands, China has committed to reaching peak carbon emissions by 2030 and to be carbon-neutral by 2060. But President Xi Jinping has said that the "method, pace and intensity" to achieve this goal "should and must be" determined by China, and "will never be influenced by others".

Never is a long time; and unfortunately the world does not have that luxury. As Morgan stressed in Chennai: "While fires rage around the world and temperatures break records, the G20 as a group has unfortunately been unable to act with the necessary sense of urgency and clarity."

In the 2015 Paris Agreement, 196 countries signed a legally binding international treaty to hold "the increase in global average temperature to well below 2°C above pre-industrial levels" and pursue efforts to "limit the temperature increase to 1.5°C above pre-industrial levels. Eight years later, the temperature rise so far is at least 1.1°C, the UN Intergovernmental Panel on Climate Change has found. According to the UN, to achieve the Paris target, greenhouse gas emissions must peak before 2025 at the latest and decline 43 per cent by 2030.

China and Saudi Arabia are both signatories to the agreement and have made pledges to cut emissions accordingly. And while no country likes being dictated to, it is plain to see that there is now a clear need for everyone to do more. National interests must be put to one side. The EU has shown that it is possible to massively reduce the use of gas in times of crisis. The UK's recent plan to re-invest in North Sea oil and gas may be questionable in terms of alignment with global warming efforts, but it has shown that a country can phase out the use of coal for power generation very quickly.

To the contrary, China has approved more than 50 GW of new coal power in the first six months of 2023, according to recent research by Greenpeace. It is a direction of travel that gives cause for concern, as these plants will lock-in emissions for decades to come.

In the face of a climate crisis that is here already, it's high time for heads of state to throw out the cold, weak tea served up as "agreements" at these meetings, and for China to bring some hot green tea to the table.

Cartoon: jemsoar.com