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Record clean energy spending is still not enough, says IEA

Birol says a "massive surge in investment" is the only lasting solution

Although energy investment is up, the International Energy Agency says that it is not enough to tackle the climate and energy security crises, and highlights a worrying return to coal.

Junior Isles

Global energy investment is set to increase by 8 per cent in 2022 to reach $2.4 trillion, with the predicted rise coming mainly from clean energy, according to a new report by the International Energy Agency (IEA). Although encouraging, the growth, however, still falls short of the level needed to tackle the twin threats of climate change and energy security.

The Paris-based agency's 7th 'World Energy Investment 2022' report finds fastest growth in energy investment is coming from the power sector – mainly in renewables and grids – and from energy efficiency.

It also says that the rise in clean energy spending is not evenly spread geographically, with most of it taking place in advanced economies and China. And in some markets, energy security concerns and high prices are prompting higher investment in fossil fuel supplies, most notably in coal.

"We cannot afford to ignore either today's global energy crisis or the climate crisis, but the good news is that we do not need to choose between them – we can tackle both at the same time," said IEA Executive Director Fatih Birol. "A massive surge in investment to accelerate clean energy transitions is the only lasting solution. This kind of investment is rising, but we need a much faster increase to ease the pressure on consumers from high fossil fuel prices, make our energy systems more secure, and get the world on track to reach our climate goals."

Clean energy investment grew by only 2 per cent a year in the five years after the Paris Agreement was signed in 2015. Since 2020, the pace of growth has accelerated significantly to 12 per cent but the IEA said there is a worrying gap between investments from advanced and developing countries. G7 countries must generate 42 per cent of their electricity by wind and solar by 2030 to keep global warming to 1.5°C by 2050, the IEA has calculated.

The IEA has estimated that global investment into power in 2022 totalled about $975 billion, versus an annual requirement of $1.2 trillion to achieve countries' stated policies, and $2 trillion to reach net zero.

The agency advocated for financial and technical support, including concessional capital, private sector capital, and inflows from international carbon markets, as "crucial" for closing the gap.

In terms of technology, the report finds that renewables, grids and storage now account for more than 80 per cent of total power sector investment. But while, spending on solar PV,

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G7 vows to decarbonise electricity by 2035

The G7, made up of the world's largest economies, have agreed to "predominantly decarbonised electricity sectors by 2035". The G7 also agreed to end government financing for international coal fired power generation and speed up the phase-out of unabated coal plants by 2035.

The pledge marks the first commitment from the G7 countries to quit coal fired power generation.

After a two-day meeting at the end of May, in Berlin, Germany, which currently holds the G7 presidency, Energy and Environment Ministers issued a communiqué setting out a wide range of actions to tackle "the triple global crisis of climate change, biodiversity loss and pollution" while condemning Russia's invasion of Ukraine and warning of the war's consequences.

The International Energy Agency's analysis and activities were cited throughout the communiqué, spanning many key areas including efforts to improve energy efficiency, the need for increased investment in renewables, tracking of methane emissions, ensuring sufficient critical mineral supplies for clean energy technologies, and the IEA's "timely" 10-Point Plan to Reduce the European Union's Reliance on Russian Natural Gas and 10-Point Plan to Cut Oil Use, which were produced in response to the energy market impacts of the Russian invasion.

The German presidency promised to push for ambitious climate action at a second summit, which kicked off in Bavaria at the time of writing.

Germany's Federal Minister for the Environment and Consumer Protection, Steffi Lemke, and the Federal Minister for Economic Affairs and Climate Protection, Robert Habeck, will jointly host and lead the work process of the G7 ministers of the environment, climate and energy until 31 December 2022.

Germany is pursuing the following work priorities under the so-called "G7 Climate and Environment Track", which covers: accelerating the global phase-out of coal; forced decarbonisation of sectors; systemic change towards environmental sustainability in all areas of life; combating species extinction; and initiatives to protect the oceans.

In addition to these, the ministers of the environment, climate and energy will also continue to pursue items from the previous G7 agenda. These include the sustainable use of resources, adapting to the impact of the climate crisis and environmentally sustainable supply chains.

Since the climate and biodiversity crises are closely interlinked and require coordinated solutions, Minister Lemke and Minister Habeck have agreed to hold joint meetings of the environment, climate and energy ministers.

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batteries and electric vehicles is now growing at rates consistent with reaching global net zero emissions by 2050, the IEA said that many other technologies also "need to be on track".

During the launch of the report, Tim Gould, Chief Energy Economist at the IEA, said that emerging technologies such as carbon capture utilisation and storage (CCUS) and hydrogen needed "a helping hand" from governments.

Gould says emerging technologies need support

"They still need support on the research and development side. And then the role government is not to unblock, but to really incentivise. There are a different set of policy instruments that could be extraordinarily useful and important in bringing those new technologies up to speed and scaling to energy systems around the world."

The IEA also said there were "warning signs" in the form of a 10 per cent rise in investment in coal supply in 2021, led by emerging economies in Asia, with a similar increase likely in 2022. While it did not see this as a structural shift in the energy market, the IEA said it "would be surprised" if investment in coal did not continue to grow in 2023.

"This is for two reasons," said Birol. "One, is the high energy prices, especially gas prices, and the second is the growing energy security concerns."

Commenting on the growing use of coal, Michael Bradshaw, Professor of Global Energy at Warwick Business School, said: "The current energy crisis may stiffen the resolve of many emerging economies to stick with coal, believing it to be more secure. It may be costly, but far less so than gas. As the gas price crisis last autumn demonstrated, markets were tight before the war in Ukraine and there is little spare LNG. Many may now avoid it, aiming to leapfrog from coal to clean energy sources at some future date.

"However, it is important to note the conclusions of the IEA's Net-Zero study, that investing in fossil fuel production is not compatible with the Paris Agreement. Investing in new large-scale, long-term projects and infrastructure is not a solution to the current crisis. It could also result in 'carbon lock-in'."

With many clean energy technologies dependent on critical minerals, for the first time the World Energy Investment report includes a detailed review of investment trends for critical minerals. The report warns that higher and more diversified investment is needed to curb today's price pressures and create more resilient clean energy supply chains. Worldwide exploration spending rose 30 per cent in 2021, with the increase in the US, Canada and Latin America offering the prospect of more diversified supply in the years ahead.

Return to coal plants as gas crisis deepens

- Germany to re-open 10 GW of mothballed capacity
- UK to delay closure of three coal plants

Junior Isles

Several European countries recently announced firm plans to turn to coal fired power generation in preparation for anticipated gas supply cuts this winter.

In late June, Germany said it will pass emergency laws to reopen mothballed coal power stations, shortly after Moscow cut capacity on the main gas export pipeline to Berlin by 60 per cent.

Economic Minister Robert Habeck, a Greens MP in the coalition government, said bringing back coal fired power plants was "painful" but "a sheer necessity".

"To reduce gas consumption, less gas must be used to generate electricity. Coal fired power plants will have to be used more instead," he said. "This is bitter but in this situation essential to lower the use of gas."

Habeck said he was working to temporarily bring back up to 10 GW of idle coal fired power plants for up to two years, a move that would increase Germany's dependence on coal for electricity generation by up to a third and drive up carbon emissions.

The country aims to phase-out coal fired generation by 2030, and has set preliminary targets to cut emissions by at least 65 per cent by 2030 compared to 1990 levels. It is aiming to hit net zero greenhouse gas emissions by 2045.

Coal is still Germany's most important energy source for electricity production, providing more than 28 per cent of the country's gross electricity generated last year, according to the Federal Statistical Office. The mothballed coal capacity that will be put back on the grid accounts for just under 5 per cent of total German production capacity.

Last month neighbouring Austria also said that it would reopen a mothballed coal fired power plant in Mellach district. The country is heavily dependent on Russian fuel imports and previously said that it would take years to completely phase-out gas imports.

The government said that authorities would work with its main electricity supplier, Verbund group, to get the station back up and running. Located south of Graz, the plant was last used in 2020.

Meanwhile, the UK is to keep a Nottinghamshire coal power station open over the winter to mitigate the potential for disruption to its electricity supply. The West Burton A power station is the first extension agreed by Business and Energy Secretary Kwasi Kwarteng. There are also talks taking place with Uniper about its plant in Ratcliffe-on-Soar, Nottinghamshire, and with Drax about its coal fired unit in Yorkshire. All three plants were scheduled to stop operating this autumn.

Kwarteng said he was "not taking chances" given the volatility in the market and was "pleased that EDF has confirmed West Burton will remain online".

UK government ministers, however, came under fire following EDF's announcement that a request to extend the life of its Hinkley Point B nuclear plant had come too late. EDF Energy issued a memo in June to explain that time had "run out" to delay the plant's scheduled closure at the end of July.

The company explained that the stringent safety regime and the complexities of inspecting ageing reactors means any attempt to extend their lives requires long lead times.

Sue Ferns, senior deputy general secretary at the trade union Prospect, agreed. "None of this should come as a surprise. Even before the war in Ukraine, there were warnings about [gas] constraints throughout last winter," she said.

The union had urged the government in April to look into extending the life of Hinkley Point B and other ageing nuclear plants.

Renewables move into overdrive but raw materials prices could derail REPowerEU plans

Edison Group, the global investment research and advisory firm, has released a new report, which explores how Europe's geopolitical crisis will accelerate the replacement of foreign fossil fuel imports, putting renewables into overdrive.

The report, 'European renewables: An increasingly attractive environment', suggests the EU could produce more than 65 per cent of its electricity from renewables in 2030. This assumes a 30 per cent increase in electricity demand, due to the electrification of transport and heating.

The report comes after the European Commission published details of its REPowerEU plan in May, aimed at reducing reliance on Russian fuel imports.

RePowerEU proposes that two-thirds of the EU's Russian gas imports can be replaced by 2022, with the remainder by 2030 – achieving this by initially diversifying gas supplies and accelerating the deployment of renewable power.

James Magness, Director, Energy & Resources, Edison Group, noted: "The geopolitical crisis in Europe has accelerated the need for European countries to decarbonise power generation. With the European energy crisis and Russia's invasion of Ukraine resulting in a rise in fuel prices – and we believe they will remain structurally higher in the long-term – there has never been more opportunity for renewable energy developers to benefit, particularly in the solar and wind sectors."

A recent report published by RenewableUK shows that the global pipeline of offshore wind projects has almost doubled over the past 12 months, from 429 GW of capacity a year ago to 846 GW.

Launching the 'EnergyPulse' report, RenewableUK's CEO Dan McGrail said: "Countries around the world recognise the urgent need to ramp up the transition to clean power – not only to tackle climate change, but also to provide secure supplies of low-cost home grown electricity for people hit hard by international gas prices going through the roof."

Some, however, warn that the much needed ramp-up of wind and solar could be derailed by soaring material prices.

The REPowerEU initiative has the potential to add at least 420 GW of solar installations by 2030 but rising solar raw material costs could become the stumbling block to achieving this goal, said Wood Mackenzie, a Verisk business.

Global solar PV installations, it says, will grow at a compound annual rate of 8 per cent between 2022 and 2031 to over 3500 GW of total installed capacity. Europe is expected to account for over 9 per cent or about 331 GW of installations within the period, with potential from the REPowerEU initiative to more than double the expected installations.

Wood Mackenzie senior analyst, Theo Theodorou, said: "The global push to phase-out fossil fuels and move to cleaner energy sources has driven innovation and policies that have resulted in tremendous cost reduction in the solar PV sector over the last two decades.

"However, last year, a perfect storm of Covid disruptions, rapid recovery in demand from solar installations, fast-increasing freight rates, and high solar raw materials prices have pushed module prices more than 20 per cent higher. Global prices for key raw materials such as polysilicon, silver, aluminium, copper and steel have all reached multi-year highs."

He added: "…Europe needs to navigate this high price environment and act fast to develop a local solar supply chain to achieve its targets."

Decisive action needed on hydrogen

Experts are urging the EU to speed up renewables and renewable hydrogen to secure industrial energy supplies, as pressure mounts around energy security and climate change.

As heads of the G7 prepared to meet in Bavaria at the end of June, WindEurope and the European Steel Association (EUROFER) stressed that availability and affordability of renewables and renewable hydrogen for industries such as steel, ready to decarbonise at large scale, must become the EU's top priority for reaching climate neutrality and accelerating independence from Russian fossil fuel supplies.

"The steel industry has developed breakthrough technologies for producing low carbon steel that rely on non-fossil energy sources, but we don't have enough renewables production nor the related infrastructure to transport it where it has the highest impact", said Axel Eggert, Director General of EUROFER. "The rapid expansion of wind energy and connected power grids and hydrogen production infrastructure is key for a successful transition."

During the Renewable Hydrogen Summit organised by the Renewable Hydrogen Coalition (RHC) at the end of May, the RHC said it believes that the EU is at the right time to take decisive action to reach the European target of a 2000-fold increase in current green hydrogen production capacity.

The coalition called on policymakers to streamline permitting of renewables and declare renewable hydrogen installations to be in the public and industry's interest. It also called for the EU to adopt the most ambitious binding targets for the uptake of renewable hydrogen and derived e-fuels in hard-to-electrify industry and transport, as proposed by the European Commission.

In a new report, DNV said significant policy interventions are needed by governments around the world. Its 'Hydrogen Forecast to 2050' report, predicts the amount of hydrogen in the global energy mix will be only 0.5 per cent in 2030 and 5 per cent in 2050. However, to meet the targets of the Paris Agreement, hydrogen uptake would need to triple to meet 15 per cent of energy demand by mid-century.

The report says that by 2050 a surplus of renewable energy will be needed to power an electrolyser capacity of 3100 GW. This is more than twice the total installed generation capacity of solar and wind today.

- In June the European Commission unveiled plans to kick-off a European Electrolyser Partnership. This Partnership aims to address the challenges in establishing and maturing a strong industrial manufacturing base in Europe and identify potential mitigating policies and actions where necessary.

Brazil sell-off moves Eletrobras into private ownership

- State holding below 50 per cent
- Offshore wind sector attracts major players

Janet Wood

Brazilian power utility Eletrobras has raised almost $6 billion in a stock sale that in effect privatises the company, reducing the government's holding below 50 per cent. It fulfils a pledge of President Jair Bolsonaro, who says placing control of Eletrobras in private hands will unlock extra investment.

The privatisation has been opposed by former President Luiz Inácio Lula da Silva and he may seek to reverse the Eletrobras divestment, if he defeats Bolsonaro in October elections.

Guido Mantega, Finance Minister between 2006 and 2014, said: "I have no doubt that there are ways, even if, in the end, the shares have to be repurchased."

But provisions in the sell-off designed to limit single holdings below 10 per cent would add a premium if that were pursued. "It would become very expensive, almost economically unviable," said Fabio Coelho, President of the Brazilian Association of Capital Markets Investors. "If someone wanted to buy more than 50 per cent of the company, there would be a 200 per cent premium."

Eletrobras supplies about a third of Brazil's electricity, mostly from hydropower. The government aims to diversify supply and a new regulatory framework for offshore wind recently went into effect. Brazil's Institute for Environment and Natural Resources is assessing 55 applications for projects.

Among them, Ocean Winds – a joint venture of ENGIE and EDP Renewables – has launched OW Brasil and is seeking permits for five projects totalling 15.2 GW. Ocean Winds Chief Executive Bautista Rodríguez said: "The development of this new sector of activity in Brazil is an important opportunity to meet the growing demand for energy, develop green hydrogen projects, diversify the energy matrix, and thus ensure the country's energy security with a renewable source that has a competitive cost for the consumer compared to fossil sources".

TotalEnergies, Shell, Equinor, BlueFloat Energy, Qair and Corio have also announced plans for offshore wind development in the country.

Corio Generation, part of of Macquarie's Green Investment Group, has plans for five fixed-bottom projects totalling 5 GW in partnership with Brazilian generator Servtec. It is Corio's first foray into the Americas.

"We see huge opportunity for harnessing Brazil's ocean wind energy, bringing economic investment and green jobs to the country," said Jonathan Cole, Chief Executive of Corio Generation.

Meanwhile Shell Energy Brasil has recently announced plans for up to 2.1 GW of solar farms in Minas Gerais, nearly doubling the state's 2.4 GW solar capacity.

Mexico sets out investment needed for hydrogen

Mexico requires green energy investments totalling $60 billion by 2050 if it is to meet its hydrogen demand of 2700 kt by mid-century, according to new analysis. But the investment would add $46 billion to the GDP, 3.2 million jobs would be created and emissions of 53 Mt of carbon dioxide would be avoided by 2050.

The scale of the demand, for domestic consumption in the petrochemicals, electricity generation, iron and steel, glass, chemicals, cement and mobility industries, as well as for export, was revealed at the recent Mexican Hydrogen Congress organised by the Mexican Hydrogen Association (AMH2).

That would require installation of more than 80 GW of renewable energy capacity, mainly solar and wind, according to the new study, 'Green Hydrogen: The energy vector to decarbonise Mexico's economy', conducted by PwC and AMH2. That would be required to power 51 GW of electrolysis to produce the required hydrogen.

Joaquín Mendoza, a consultant at PwC, said: "By overcoming those barriers and establishing a cost to carbon, we expect cost parity to be reached by 2040." With the deployment of the technology, the cost is expected to drop by 2030 to $5.3/kg and by 2050 to $2.4/kg, according to the study.

US kicks off $8 billion green hydrogen programme

The US Department of Energy (DOE) has announced it will fund an $8 billion programme to develop regional green hydrogen hubs (H2Hubs) across the country, using renewables-powered electrolysis.

DOE's Office of Energy Efficiency and Renewable Energy has been working on H2 Matchmaker, an online tool that helps hydrogen suppliers and users join regional green hydrogen hubs.

"The production, processing, delivery, storage, and end-use of clean hydrogen, including innovative uses in the industrial sector, is crucial to the DOE's strategy for achieving President Biden's goal of a 100 per cent clean electrical grid by 2035 and net zero carbon emissions by 2050," the Department of Energy said.

The US already produces 10 million tonnes of hydrogen per year from natural gas, using steam methane reforming. Hydrogen producer Linde has joined forces with BP to add carbon capture and storage (CCS) to Linde's existing hydrogen production facilities on the Texas Gulf Coast.

BP will appraise, develop and permit the geological storage sites for permanent sequestration of the CO_2, and use its trading and shipping business. Linde will use its technology and operational expertise to capture and compress the carbon dioxide, and will transport the hydrogen, using its existing hydrogen pipeline network.

The project could start up by 2026.

US solar installations win reprieve over tariffs from Asian suppliers

- Decision frees up battery storage alongside
- Solar projects get go-ahead

The Biden administration's recent decision to extend a 'tariff window' on solar panels has helped the power sector reach one of its highest ever installation rates – and taken some of the heat out of fears that the US could see power shortages.

President Joe Biden declared a potential power supply emergency in the reasons for his decision to extend the low-tariff period. The text of the decision states: "Multiple factors threaten the ability of the United States to provide sufficient electricity generation to meet expected customer demand," including disruption caused by invasion in Ukraine and extreme weather events." That meant, "to ensure sufficient electricity resources, utilities and grid operators must engage in forward planning to build new capacity to meet public demand" – especially solar power, which is quick to install.

The statement notes that in recent years the US has been unable to import enough solar modules. "This severe shortage of solar modules and module components has abruptly put at risk near-term solar capacity additions that might otherwise have the potential to help ensure the adequacy of electricity generation to meet customer demand," said Biden.

The new tariff exemption will also apply to panels from Cambodia, Malaysia and Thailand and serve as a "bridge" while US manufacturing ramps up, said the White House.

The move has halted a US commerce department investigation that was said to be having a "chilling" effect on the sector. Recently energy consultancy Rystad Energy said up to 17.5 GW of planned solar installations in 2022 were in jeopardy.

The decision unblocks investment in many storage projects. John Hensley, Vice President of Research and Analytics at ACP said it "restores predictability to both the solar and energy storage markets. With well over 50 per cent of utility storage projects being paired with solar farms, this important executive action will help the energy storage market continue to accelerate".

The US energy storage market set a new record for the first quarter of 2022, with grid-scale installations totalling 2399 MWh – four times the volume seen in Q1 of last year.

Recently major projects have been cleared for development. The US Bureau of Land Management (BLM) has issued Clearway Energy Group with a notice to proceed with two California projects that will together deliver 465 MW of solar and 400 MW of battery storage.

Across the country in New York, Governor Kathy Hochul announced awards for 22 large-scale solar and storage that will add more than 2 GW energy and 160 MW of storage to the state, raising the state's renewable energy total in its overall energy mix to around 66 per cent.

US ready to innovate to cut costs, boost installation of offshore wind

US offshore wind farms could share connection routes to the onshore networks, if research now under way has a favourable outcome.

Wind energy consultancy OWC is researching allowing offshore wind projects to use the same landfall location and potentially the same onshore corridor, on behalf of the National Offshore Wind Research and Development Consortium (NOWRDC). The government believes co-ordination could reduce cable landfall and onshore constraint issues.

OWC will identify a reference project as the basis of the study, such as two or three potential New York Bight projects, which will be discussed with stakeholders and developers, costed and compared with the base case.

"NOWRDC recognises that onshore and landfall cable constraints are a key barrier for offshore wind… The aim is to develop a conceptual design for landfall and onshore cable infrastructure that could be shared by two or more different projects," said Jeff Fodiak, OWC's country manager in the US.

Meanwhile, Equinor and BP have launched a new Offshore Wind Innovation Hub in New York. "The new Innovation Hub will leverage the success of the Urban Future Lab in promoting and helping the launch of cleantech start-ups, fostering collaboration with the international incubator community to cultivate pilots and demonstration projects that accelerate advances in offshore wind," according to Equinor.

Australia to include fossil fuels in new market design to boost system security

- ESB tasked with designing new capacity mechanism
- Greens will not support any scheme that keeps fossil-fuelled generators running longer

Syed Ali

Australia's federal government is considering a new electricity market mechanism aimed at ensuring stability in the national electricity grid as it moves to a cleaner energy mix, but is concerned about excluding fossil fuels from the generating mix.

The federal government's Energy Security Board (ESB) has been tasked with designing the new mechanism, which would pay generators through an auction process for the capacity they can provide.

In the current setup, power generators in the national electricity market – which serves the east coast and South Australia – are only paid for the electricity they produce.

The ESB said introducing such a tool by mid-2025 was going to be vital to ensuring much more capacity enters the grid in the coming decades, and a smooth transition to net zero emissions by 2050.

There have been calls for the new mechanism to exclude existing generators, particularly coal and gas. But the board argued it was important that the mechanism could access a mix of technologies, and discourage the early exit of existing generators before new generators – particularly renewables – were ready to take their place.

States and territories would still be given the final say on which generators were eligible for the payments in their jurisdiction.

The Victorian government had previously insisted states be given the right to determine which technologies were supported, arguing incentives should only be directed toward zero-emissions technology.

Victorian Energy Minister Lily D'Ambrosio said the ESB's plan provided the flexibility they wanted to see.

Prime Minister Anthony Albanese said the proposal appeared sensible, while Energy Minister Chris Bowen called the proposal a positive step forward.

With the draft now open for public comment, ahead of a detailed plan to be put to energy ministers at the end of the year, Greens leader Adam Bandt has warned that any scheme that served to keep coal and gas fired generators running longer could not be supported.

"Paying them to stay in the system longer is only going to prolong the problems, and also prolong the transition to renewables," Bandt said.

The proposal comes amidst a crippling power crisis caused by rising coal and gas prices, coupled with outages at ageing coal fired power stations. In June, the market turmoil forced the Australian Energy Market Operator to take control of the wholesale market to ensure reliable supply of electricity to eastern states. Australian authorities also gave themselves the power to block coal exports if the resource is needed to ease the crisis.

Analysts said the energy crisis has highlighted the failure of Australia, one of the world's largest producers of fossil fuels, to prepare for the transition to renewable energy sources by investing in modernising the country's electricity infrastructure.

■ Western Australia's state-owned coal power stations will be retired by 2030, as part of their efforts to transition to a greater use of renewables, especially rooftop solar, the government said in a statement June 14.

India's ambitious renewable targets faces challenges

India's ambitious plan to meet its renewable energy targets is facing a number of challenges, including financing and regulatory, according to a new report from BloombergNEF (BNEF).

The report, 'Financing India's 2030 Renewables Ambition', published in association with the Power Foundation of India, finds that corporate commitments from Indian companies could help India achieve 86 per cent of its 2030 goal of building 500 GW of cumulative non-fossil power generation capacity.

By 2021 165 GW of zero-carbon generation had already been installed in the country.

India's Central Electricity Authority forecasts the country's reliance on coal to drop from 53 per cent of installed capacity in 2021 to 33 per cent in 2030, whereas solar and wind together make up 51 per cent by then, up from 23 per cent in 2021.

The report notes, however, that meeting this target will require $223 billion of investment in order to meet its goal of wind and solar capacity installations by 2030.

Shantanu Jaiswal, lead author of the report and head of India research at BloombergNEF, said: "To date the growth of renewable energy in India has been funded by a diverse set of financiers. Debt and equity structures have evolved as the market grew and new risks emerged. India's ambitious renewable energy targets now require further scaling up of financing with new instruments and learnings from other global markets."

Yet, the scaling up of renewables in India faces regulatory, project and financing risks, with PPA renegotiation, land acquisition and payment delays cited as key risks by industry stakeholders surveyed by BloombergNEF. In the short-term, rising interest rates, a depreciating rupee and high inflation create challenges for the financing of renewables.

Rohit Gadre, an analyst in BNEF's India research team, commented: "Scaling up financing to meet 2030 goals requires Independent Power Producers to tap into new or underutilised sources of capital. These could be revolving construction debt, investment infrastructure trusts and funding from retail investors, insurance companies and pension funds. Higher funding requirements also need measures that can increase the availability of financing, such as de-risking renewable projects to offering contractual terms that provide greater comfort to investors."

■ India's Ministry of New and Renewable Energy (MNRE) will open its first offshore wind tender in the next three to four months to lease blocks off the state of Tamil Nadu, which can accommodate around 4 GW of offshore wind capacity.

China to boost renewables under new renewables Five-Year Plan

China plans to source about 33 per cent of power from renewable sources by 2025, up from 28.8 per cent in 2020, under a new Five-year plan for the renewable sector.

The National Development and Reform Commission (NDRC) said renewables would account for more than half of new energy consumption growth from 2021-2025 period, but China still has leeway to build more fossil fuel-fired power plants over the period as it focuses on improving energy security.

Total renewable energy consumption will reach 1 billion tons of standard coal by 2025, according to the plan, while the scale of non-electric utilisation including geothermal heating, biomass heating and fuel, as well as solar heat utilisation, will also exceed 60 million tons of standard coal.

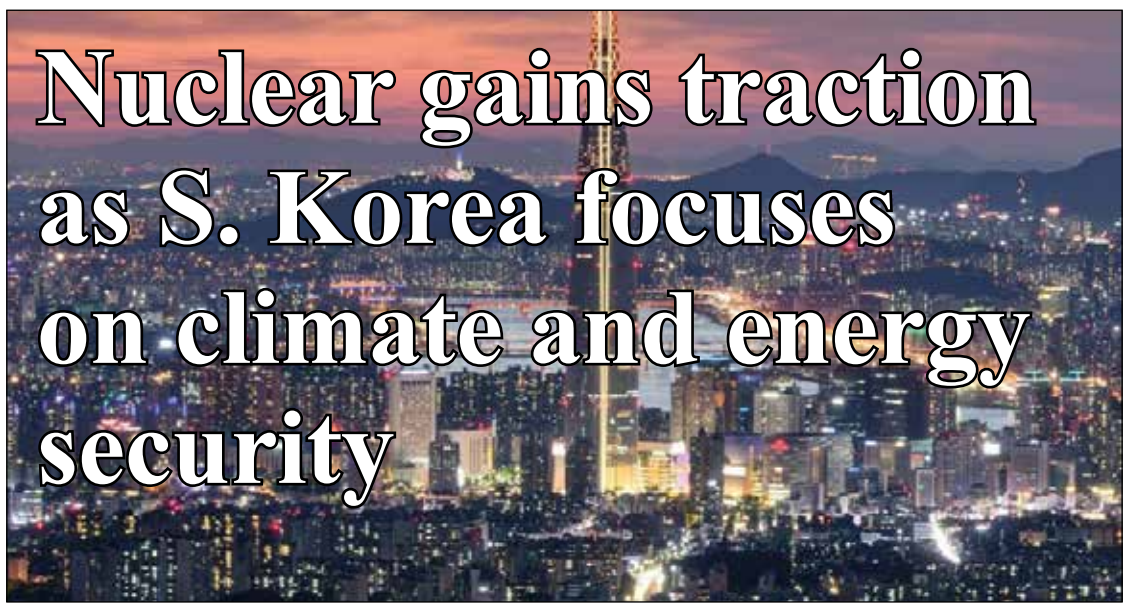
According to a statement released by the NDRC, China will generate 3.3 trillion kWh of electricity from renewable energy by 2025, with power generated by wind and solar power doubling. Non-fossil energy consumption will account for around 25 per cent of the total by 2030, and renewable energy will further replace fossil fuels to facilitate the country's construction of a low-carbon energy system, it said.

In June China vowed to speed up the construction of the second batch of massive wind and solar power projects in the Gobi Desert and other arid regions, according to a package of policy measures announced by the State Council that aims to stabilise the economy.

China launched the first phase comprising 100 GW of wind and solar power capacity in the desert areas at the end of 2021. The second phase of projects will still focus on the Gobi and other sandy and rocky regions, and is expected to encourage investment of up to Yuan3 trillion ($450.9 billion) in related industries.

Wei Hanyang, a power market analyst at research firm BloombergNEF said China's plan to further optimise its energy mix by building massive wind and solar power facilities in the Gobi and other desert areas will facilitate the country's ambition of reaching more than 1200 GW of installed solar and wind capacity by 2030.

Wei also noted that it would be necessary to plan and build more ultra-high voltage transmission lines for connecting the renewable energy with coastal demand centres – likely hitting 300 GW of transmission capacity by 2025 from around 200 GW last year.



Nuclear gains traction as S. Korea focuses on climate and energy security

Nuclear power, and in particular small small scale nuclear, looks set to be a key part of South Korea's efforts to address the twin threats of climate change and energy security.

The government has announced it will spend Won399.2 billion ($321 million) over the next six years to foster the growth of small modular reactors (SMRs). The plan to develop this new growth driver gained serious traction after passing the government's feasibility test, which is required for large, long-term state-run projects, the science and industry ministries said.

The Ministry of Science and ICT and the Ministry of Trade, Industry and Energy said the project, which was approved at the end of May, is a step toward the rapid advancement of nuclear power energy via stable investment in research and development.

The initiative, tentatively named the "i-SMR development project", will from 2023 to 2028 manufacture reactors with a generating capacity of less than 300 MW.

The ministry said the passage of the feasibility study presents an enormous opportunity for growth in the country.

"The government's nuclear energy will prioritise safety and economic feasibility to meet the stable energy demands by the public," the ministry said in a statement.

Meanwhile, last month South Korea's environmental and energy security goals were bolstered by the grid connection of Shin Hanul 1, a 1400 MWe nuclear reactor, which started to supply electricity to the South Korean grid on June 9.

North Sea grid needed to support growing offshore wind targets

■ Four countries see target multiplied ten-fold ■ Norway to link wind with offshore platforms

Janet Wood

Northern European countries are discussing plans to create a common power grid under the North Sea to connect their future offshore wind farms.

Fears over depending on Russian oil and gas have reinforced the countries' ambitious plans for offshore wind. Four countries – Denmark, the Netherlands, Germany and Belgium – have in already announced plans to raise their offshore wind targets ten-fold, from 15 GW to 150 GW. Now others are close behind. For example Norwegian Prime Minister Jonas Gahr Store recently announced plans for 30 GW of offshore wind by 2040, meaning Norway will be producing wind energy equal to its current total demand.

The Prime Minister said Norway will now begin to identify offshore zones and ease permitting procedures and it will begin the offshore licensing round in 2025. Norway has already identified two offshore sites for the wind farm and an auction for the first tranche of 1.5 GW of floating wind farms might take place in 2023.

The country recently saw the start of installation of pre-commercial floating turbines, when the first of 11 Siemens Gamesa 8.6 MW turbines for Equinor's Hywind Tampen floating wind farm was installed at the site 140 km off the coast. Once commissioned by the end of 2022, the 94.6 MW Hywind Tampen will become the largest floating offshore wind farm in operation, and it will be connected to the nearby Snorre and Gullfaks offshore oil and gas platforms, meeting 35 per cent of their power needs.

In some areas new projects granted permission by different countries are relatively close to each other. Recently, for example, Vattenfall welcomed a Swedish government decision to grant construction permit of an offshore wind farm at Kriegers Flak in the south of the Baltic sea. The application covers up to 50 wind turbines with a total capacity of approximately 640 MW. On the Danish side of Kriegers Flak, Vattenfall has already commissioned Denmark's largest wind farm. On the German side there has been a wind farm in operation since 2015.

"The more interdependent we are in Europe, the more independent we will be from Russia," European Commission President Ursula von der Leyen said during a recent visit to the Danish port of Esbjerg. "We all know that green power generation is great. But if you really want to use it, you need a grid and that's where we need to step up," she said.

So far there is one hybrid cable in operation in Europe, connecting several Baltic Sea wind farms with Denmark and Germany, operated by Energinet and German grid operator 50Hertz, of which Elia owns 80 per cent. Several more hybrid interconnectors are planned across Europe, but the main obstacle is the lack of a clear European regulatory framework, according to Giles Dickson, head of industry lobby group WindEurope.

Iberian isolation allows for energy market action

Spain and Portugal have been awarded a derogation by the European Commission to allow them to take action in the energy markets. It will allow Spain and Portugal to cap the price at which gas participates in the marginal electricity market in order to lower electricity prices. The Iberian countries were allowed the derogation because a lack of interconnectors with the rest of Europe limit their participation in the bloc's energy markets.

"Spain and Portugal have an exception endorsed by the European Commission that allows us for one year to have an exceptional adjustment that avoids the contagion of gas prices to the whole electricity market," said Spain's Minister of Ecological Transition, Teresa Ribera.

The countries are also looking for options to add to domestic renewables capacity and the Spanish government has announced a €150 million programme to modernise wind farms.

The government aims to upgrade 430 MW of wind power and 50 hydroelectric plants. It also aims to improve recycling of wind turbine blades and other materials.

Ribera said: "Spain has just climbed one place in the attractiveness index for investing in renewables, to ninth, and there is growing interest in signing [long-term] power purchase agreements to give stability to the industry."

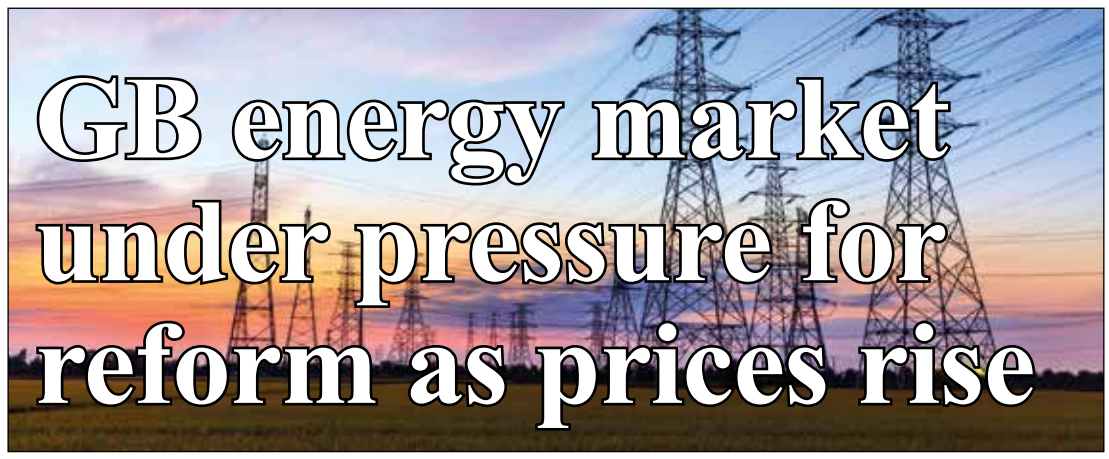
Portugal raises ambition on wind, looks to more links

Portugal has announced that it will delay its first offshore wind auction to 2023, but will increase its ambition, according to João Galamba, the country's Secretary of State for Energy. It had initially planned to hold its first auction this summer for up to 4 GW of capacity, whereas now it will seek between 6 GW and 8 GW.

Galamba said the delay arose because tendering for offshore wind is "more complex" than other renewables, because it involves industrialisation of ports. But he said Portuguese plans to reinforce coastal grid infrastructure will enable more offshore wind in future. Galamba said the government has already had talks with Ørsted, Iberdrola, OW Ocean Winds, a Portuguese-French consortium of EDP Renewables and Engie, and a number of German companies.

In 2017, the Portuguese government approved the Industrial Strategy for Ocean Renewable Energies, which highlighted potential for 117 GW of floating wind and 14 GW of fixed turbines.

Portuguese Prime Minister Antonio Costa, meanwhile, emphasised the "need to conclude a programme of interconnections between Portugal, Spain and the whole of Europe" to maintain supply security, in a recent meeting of the EU's energy ministers. He stressed that financial support would be needed to underwrite the necessary links.



GB energy market under pressure for reform as prices rise

■ Company failures add to consumer bills
■ New market framework seen as necessary to meet net zero

GB energy regulator Ofgem has advanced proposals to increase its oversight of energy suppliers after over two dozen failed when wholesale energy prices multiplied.

Ofgem had followed a "light touch" regulatory regime, aiming to promote innovation and lower prices for customers. But the costs incurred as companies exited the market have left customers with an estimated £2.7 billion bill. In a recent report the UK's National Audit Office (NAO) said Ofgem's approach to licensing and monitoring suppliers increased the risk and cost of them failing.

Jonathan Brearley, Chief Executive of Ofgem, said the new plans for oversight "are another step in making sure the complex energy market is fair, resilient and works for everyone".

Brearley added: "The energy market remains incredibly volatile and there are a number of huge geopolitical issues continuing to apply massive pressure."

The failures amid rising energy costs have added to pressure for reviews of the GB energy market structure.

Among the issues are the role of gas in price-setting. Less than 40 per cent of Great Britain's electricity is now generated in gas fired power plants, with renewables providing much of the rest. But consumers do not see the full benefit from wind and solar plants that generate at low cost because gas, as the 'marginal' generator, sets the price. That framework may be reformed, but it is expected to be a slow process.

Tom Edwards of energy consultancy Cornwall Insight, said: "Reform of the electricity market is necessary for meeting the demands of a net zero world and having a 21st Century system, but it is unlikely to fix the cost of living crisis this winter. This is a change that will take a long time to implement, possibly around two to three years."

Any reform may include changes to the UK's successful Contracts for Difference scheme which gives investors a predictable revenue stream for their project.

Meanwhile the UK government has been pressed to finalise its Regulated Asset Base (RAB) model, which is expected to be used for the proposed Sizewell C new nuclear plant. Recently the government published documents which it said "show significant progress" towards implementing the new model. The government has also invested £100 million in an option to take a 20 per cent stake in the £20 billion plant. Ministers said that would be converted into equity if the project reaches a final investment decision.

Poland decarbonisation "on a par with post war reconstruction"

The investment needed to decarbonise Poland's energy sector is at least $300-400 billion by 2030 – comparable to the reconstruction of Poland after World War II, according to Paweł Strączyński, Vice-President of Finance at Polish bank Pekao. Speaking at the recent World Economic Forum in Davos, Switzerland, he said: "Within this amount there are investments both in energy infrastructure, construction of new energy sources, but also in distribution networks, including electricity, gas, and later also hydrogen," adding that private investors would be needed as well as state-owned companies and national entities.

Jerzy Kwieciński, Vice President of the Management Board of Bank Pekao, said that such a huge challenge is impossible to undertake without the involvement of the entire banking sector, adding: "Companies already involved in this process and planning further major investments in this area can find an ally in us."

Meanwhile Poland's nuclear power plan is advancing. US company Bechtel is working with Westinghouse Electric Company to develop Westinghouse AP1000 reactors for use in Poland. Now Bechtel has agreed to collaborate on the supply of steam turbines and generators with Toshiba subsidiaries in Japan and the USA.

Toshiba recently supplied steam turbines and generators to the Barakah nuclear power plant in the United Arab Emirates.

Insurer warns of growing risks for renewables

Supply chain disruption and rising inflation shine a light on the poor resilience of renewable energy projects. **Nadia Weekes** reports.

Increased downtime and uncertain revenues are affecting the resilience of renewable energy projects in the aftermath of the Covid-19 pandemic, according to London-based renewable energy project underwriter GCube Insurance Ltd.

In its latest market insights report, "Supply Another Day: Gauging the insurance impacts of renewable energy's supply chain challenge", GCube articulates the impacts of global supply chain disruption and rising inflation on renewable energy developers, manufacturers and insurers.

It calls for better cooperation, precise evaluation of insured values and targeted investment in skills and supply chain diversification in order to improve resilience for the global renewable sector.

According to the report, the pandemic and subsequent supply chain disruptions have pushed sector-wide average business downtime days up by 38 per cent on 2016 levels, reversing a downward trajectory seen in 2018 with a more than 10 per cent rise in downtime days between 2019 and 2020.

The global solar industry has witnessed the worst effects of this disruption, with a 95 per cent increase in average downtime days. Recurring lockdowns in China, combined with a shortage of other options for the manufacture and supply of complex solar components worldwide, have exposed the weaknesses of the solar industry's total reliance on Southeast Asia.

Without an industry-wide effort to diversify the solar supply chain, procurement delays and cost inflation are set to increase, the report warns. The dearth of public and private sector investment within supply chains has hindered both the establishment of new supply routes and the development of key skills and expertise, it continues.

In the absence of funded development, the supply chain is unable to scale up its resources and its personnel to accommodate the growing demands of the sector. This is a particular challenge for contractors, who face pressures to stretch resources and drive down their rates to capture emerging opportunities.

GCube predicts an increase in contractor quality claims over the coming months as original equipment manufacturers (OEMs) struggle to accommodate the strain on their resources and rates.

"The market continues to face challenges that are unprecedented in GCube's 25+ years of experience working with renewable energy insureds," said GCube's CEO, Fraser McLachlan. "The demand for renewable energy projects and the technology, equipment and skilled labour required to deliver them has never been higher. But the roadblocks created by the pandemic on the world's path towards a cleaner energy future have exposed weaknesses in the global supply chain, which must be urgently addressed."

He added that preparedness should represent a "make-or-break component" in the business plans of renewable energy developers. This included "taking reasonable ownership of the level of risk they bring to their projects", he said.

Zambia inks hydropower deal

Zambia and its northwestern neighbour, the Democratic Republic of Congo (DRC), have signed a memorandum of understanding aimed at constructing a joint hydropower plant to boost power generation.

The deal will see the two countries constructing the 1188 MW Luapula River hydropower generation project and the 330 kV Kolwezi/Solwezi interconnector line.

Peter Kapala, Zambia's Energy Minister, said that the project builds on existing plans for high voltage interconnectors in the region, and an initial deal signed in 2015 but not yet implemented.

The Zambia Electricity Supply Corporation and the DRC's SNEL will execute the project on the Luapula River basin, a section of the Congo River.

The project will also involve the construction of a 330 kV transmission line from Solwezi in Zambia to Kolwezi in the DRC.

Ukraine to upgrade nuclear power fleet

US nuclear power company Westinghouse is to supply fuel to all of Ukraine's atomic power stations under a deal with the country's state nuclear company, Energoatom, that aims to end its reliance on Russian supplies.

Westinghouse will also establish an engineering centre in Ukraine and increase from five to nine the number of new nuclear units it will build.

Ukraine has four working nuclear power stations. The largest, in Zaporizhzhya, fell under Russian control in the early days of the Russian invasion, in September, but is still operated by Ukrainian staff.

Ukraine has repeatedly raised safety concerns about the plant, including recent warnings that it was running out of spare parts.

Nuclear power covers around half of all Ukrainian electricity needs. Energy Minister Herman Halushchenko said that in the future Ukraine could also be a supplier of electricity to western Europe.

Halushchenko said that the agreement was a powerful step towards Ukraine's energy independence and carbon-free future.

Under the agreement with Westinghouse, nuclear fuel will be supplied from the American company's production site in Sweden, while nuclear fuel rods will be produced in Ukraine.

Ukraine completely abandoned Russian nuclear fuel after the February invasion. The country has 15 power units at four nuclear power plants.

Azerbaijan eyes ambitious offshore wind goals

- High-growth scenario sees 7.2 GW by 2040
- Opportunity to transfer oil and gas expertise

A new roadmap released by the Ministry of Energy of the Republic of Azerbaijan, the World Bank and the International Finance Corporation (IFC) shows that Azerbaijan has the potential to install more than 7 GW of offshore wind power by 2040, provided the right infrastructure development, investment and policies are in place.

The Offshore Wind Roadmap for Azerbaijan provides two strategic scenarios – one of low growth and one of high growth – to support decision-making about the regulations, frameworks and infrastructure needed for this new industry to prosper.

In the low-growth scenario, a moderate expansion of offshore wind would result in 1.5 GW of fixed-foundation offshore wind by 2040, making up 7 per cent of the country's electricity supply. The high-growth scenario outlines a more ambitious expansion with 7.2 GW of offshore wind by 2040, making up 37 per cent of its electricity supply.

The high-growth scenario would result in more jobs, faster payback and more rapid CO_2 emission reductions, due to the greater cost reduction delivered by a larger market. However, its delivery requires significant and early action.

In order to realise the country's offshore wind potential under either scenario, the roadmap recommends a number of actions, including setting interim targets for 2030 and 2036, developing and competitively bidding a 200 MW demonstration project, and exploring potential offshore wind development zones.

The roadmap also recommends modernising infrastructure, adopting international best practices to attract financing, educating government agencies and the future workforce to build the knowledge and capacity needed to deliver a pipeline of offshore wind projects.

"Over the past few decades, Azerbaijan has leveraged our oil and gas resources in the Caspian Sea for the benefit of our country's economic development. But the world is changing, and it is time to tap into a new resource in our seas: the power of offshore wind," said Elnur Soltanov, Deputy Minister of Energy for the Republic of Azerbaijan.

"Offshore wind offers our country a unique opportunity to transfer our oil and gas expertise and workforce to a new sector that can simultaneously help us achieve our goals of decarbonisation and economic diversification to pave the way to a prosperous future for Azerbaijanis," he added.

Sarah G. Michael, World Bank Country Manager for Azerbaijan, said offshore wind power could create thousands of jobs, add billions in value to Azerbaijan's economy and avoid millions of tonnes in carbon emissions.

"Further analysis shows offshore wind will play a significant role in reaching net zero emissions in Azerbaijan's power sector – a key priority for the country as highlighted in the Azerbaijan 2030 National Priorities," she added.

Ivana Fernandes Duarte, Regional Manager for the South Caucasus at IFC, said that the roadmap was an important milestone in IFC's collaboration with the Government of Azerbaijan to deploy offshore wind as part of the country's wider decarbonisation strategy.

"We at IFC are proud of our excellent collaboration with the government of Azerbaijan. We look forward to supporting the country in its journey towards renewable energy deployment… by providing both the advisory services and financing to support private-sector investment in this sector," she said.

In a separate development, Abu Dhabi-headquartered Masdar signed an agreement to develop 1000 MW of solar photovoltaic (PV) capacity and 1000 MW of onshore wind, plus another agreement to develop 2000 MW of integrated offshore wind and green hydrogen projects in Azerbaijan.

The 4000 MW agreements are an exclusive concession, with the right to develop an additional 6000 MW in a second phase. The solar PV and onshore wind agreement includes network upgrade and electricity export studies.

HE Dr Sultan Ahmed Al Jaber, Minister of Industry and Advanced Technology and Chairman of Masdar, said the projects would contribute to "the energy diversification and energy security of Azerbaijan".

The agreements underscore Masdar's leading position in renewable energy, he added, marking a significant step forward for the company's strategy to achieve a portfolio of at least 100 GW globally.

Electricity companies warn against windfall tax

The UK electricity industry is warning against any plan to extend windfall taxes to the power sector, arguing that it would damage investment and could result in unintended consequences.

Junior Isles

Hitting UK power suppliers with a windfall tax similar to that imposed on oil and gas companies will hurt the investment needed to transform the power sector, the industry has warned.

Last month, Scottish energy group SSE hit out at UK Chancellor Rishi Sunak's plan to impose a windfall tax on electricity generators, warning that the "unhelpful" threat has harmed investor confidence just as companies planned to plough billions of pounds into new energy projects in Britain.

Following the announcement of his plan for a new 25 per cent windfall levy on oil and gas producers, Sunak confirmed that he also planned to target electricity generators.

Describing electricity generators' profits as "extraordinary" as a result of high wholesale power prices, the Chancellor said he was considering "appropriate steps" to ensure generators also contributed towards support for consumers.

The plans have wiped billions of pounds off the value of power companies including SSE, Drax and Centrica.

Responding to Sunak, SSE Chief Executive Alistair Phillips-Davies told the *Financial Times*: "They [the government] used the word extraordinary profits [to justify the proposal]. Where are these extraordinary profits? I'm not entirely sure where the windfall is.

"Given that we have got very well-developed plans to invest lots in [energy] networks, lots in renewable generation, it's very clear from the share price reaction that they are affecting investor confidence and that is unhelpful for us."

The sector said it planned to reinvest more than £100 billion this decade to build more generating capacity, including more offshore wind farms and nuclear power stations to help secure more sources of domestic supply following Russia's invasion of Ukraine.

"A windfall tax on generators could delay and raise the cost of these investments – at the very time that we need to increase spending to meet the government's own aims," said Adam Berman, Deputy Director of Energy UK. "We need to make investment in cheap, clean; domestic generation easier, not harder."

Commenting on various moves by governments across Europe to ease the impact of soaring energy prices on customers, Eurelectric, the organisation representing Europe's electricity industry said it was against "price caps and claw backs" and that governments should address the fact that electricity is subject to 30 per cent taxes.

Meanwhile, Centrica, Britain's biggest energy retailer to households, said it will not launch a legal challenge against the UK Chancellor's windfall tax on oil and gas companies but warned the tax and any move by the Treasury to extend it to energy generators could cause damage to investment in the UK.

Energy UK also warned of other "unintended consequences" such as the collapse of more energy suppliers – a concern echoed by Centrica. It criticised the regulator Ofgem, saying the failures in the energy market were "both predictable and predicted".

Under mounting pressure from both the electricity industry and opposition Labour party, the UK government may yet quash any plans of adding further financial burden to hard-pressed suppliers.

According to reports, government officials have indicated privately to companies that the levy is now increasingly unlikely to apply to electricity generators.

"The direction of travel is away from a windfall tax on generators because the sector is just too complex and it could clobber investment… it turns out it's just too complex to work out who has made how much excess profit," said the *FT* quoting one person familiar with the discussions.

OEMs and industry need new approach to wind turbine development

The European wind industry needs to slow down in its attempts to further drive down the levelised cost of energy (LCOE) and scale back on building bigger turbines, according to K2 Management.

The renewable energy engineering and project management consultancy, argues that unless the relentless drive to lower the cost of renewable energy is reigned back, the ambitious targets for wind power set by European governments will not be met.

K2 Management believes that by consolidating product portfolios and focusing research and development away from simply increasing wind turbine generator (WTG) capacity, beleaguered turbine manufacturers may begin to stem the large losses experienced by the firms as they bear the brunt of significant inflation in commodity prices and raw materials, and the impediments in development timelines that prevent smooth and consistent order pipelines.

Such losses have been acutely demonstrated by both Siemens Gamesa Renewable Energy, which reported losses of more than €600 million in the first half of its fiscal year and Vestas, which recorded an €894 million operating loss in the first quarter of 2022.

"It is clear that there is a fundamental economic imbalance when – in one of the world's fastest growing industries, which has huge growth targets this decade – its key manufacturer stakeholders are making such enormous losses," said Will Sheard, Director of Analysis and Due Diligence, K2 Management.

"This is without doubt a multi-faceted challenge, exacerbated by the current macro-economic situation. But the wind industry – and the energy transition generally – may be best served by turbine manufacturers taking their foot off the accelerator when it comes to driving innovation, and simply working to deliver a small portfolio of core products, in great number, to help developers achieve these large capacity targets."

He said with LCOE for wind now at a highly competitive point, there is an opportunity for turbine OEMs to scale back in their ambitions for new, ever more efficient equipment, and standardise offshore at machines in the order of 15-16 MW."

More widely, the continuing push for larger turbines may also be contributing to disruption to more ordered methods of turbine procurement from developers, as many grapple with whether to "gamble", and build out projects with turbines currently available, or wait to see if turbine OEMs release larger more efficient machines in future.

■ International energy company, Equinor, and Technip Energies have entered a strategic collaboration to develop floating wind steel semi-substructures that aim to accelerate technology development for floating offshore wind, enable cost reductions and develop local value opportunities.

Energy companies seize hydrogen opportunities

Major energy players are raising the game in green investments, particularly in hydrogen.

In Asia, BP recently confirmed that it picked up a more than 40 per cent stake in the Asian Renewable Energy Hub project to produce and export green hydrogen in Australia. In addition, TotalEnergies and Adani announced an investment of $5 billion into the development of hydrogen and derivatives business in India.

Commenting on the announcements, Wood Mackenzie Vice President, Prakash Sharma, said: "The tide is turning on hydrogen investments in Asia. After a 100-fold jump in low carbon hydrogen project announcements over the past three years, major energy players now seem willing to raise the game on green investments.

"The investments committed by BP and TotalEnergies confirm the industry's confidence in hydrogen technology. Australia is home to nearly a quarter of all the announced projects and more capital will flow into low carbon hydrogen projects in the future if they are backed by a firm off-taker.

In Europe, Lhyfe, a pure player in renewable green hydrogen and Chantiers de l'Atlantique, an expert in offshore engineering and building highly complex ships, announced, that they have signed a Memorandum of Understanding (MoU) for the development of offshore hydrogen production platforms.

Lhyfe, which listed on the regulated market of Euronext in Paris in May, has been part of a major research programme to develop green hydrogen production at sea, as near as possible to offshore energy sources.

Last month the company also entered a MoU with Horisont Energi (HRGI), a clean energy and carbon transport and storage services provider, for the joint development of green ammonia-producing plants in Europe fed by green hydrogen plants.

Elsewhere, in what could be an interesting development, Westinghouse and Bloom Energy have agreed to jointly develop an optimised and large-scale high temperature integrated electrolysis solution for the nuclear industry.

With the ability to operate 24/7 and provide high-quality steam input, nuclear plants are said to be "well-positioned" to utilise electrolyser technology and produce substantial quantities of clean hydrogen with minimal disruption to current, ongoing operations.

"We are proud Westinghouse has turned to Bloom and our solid oxide technology to supercharge the clean hydrogen economy," said Rick Beuttel, Vice President of the hydrogen business at Bloom Energy. "Solid oxide technology is well suited for nuclear applications, efficiently harnessing steam to further improve the economics of hydrogen production. High temperature electrolysis is already garnering attention and accolades as a cost-effective and viable solution to create low-cost, clean hydrogen, which is critical to meeting aggressive decarbonisation goals."

Hitachi Energy and Schneider Electric collaborate to speed up the energy transition

Hitachi Energy and Schneider Electric have entered into a collaboration to support customers' sustainability efforts, including the decarbonisation of the energy and industrial sectors.

The non-exclusive collaboration will see Hitachi Energy leverage Schneider Electric's medium-voltage portfolio, while Schneider Electric will be able to use Hitachi Energy's high-voltage portfolio to provide more comprehensive offerings.

According to a statement, the collaboration builds on the track record, global footprint, and extensive experience of both companies in delivering projects for renewables, data centers, mining and other industry segments. Both companies expect the collaboration to ensure benefits for customers across their operational life cycle, including a more holistic offering, strengthened supply chain and enhanced efficiencies.

Cyber security: the need for organised innovation

With cyber attacks on the rise, innovation in the area of cyber security is crucial if organisations want to stay ahead of the game. **Junior Isles** hears how Siemens Energy is taking an organised approach to managing cyber security innovation.

There is no doubt; cyber attacks on the power sector are on the rise. According to a report published late last year by Dragos, Inc., two-thirds of the groups targeting industrial control systems are focused on the electricity sector. And as the energy landscape becomes more distributed and digitalised, along with a changing workplace environment, cyber threats will not only continue to increase, but attacks will also become more sophisticated.

Yet keeping ahead of the game is no small undertaking – it calls for constant innovation by energy companies and power equipment manufacturers.

Siemens Energy certainly sees innovation as key. While cyber security is often simply thought of in terms of the need to protect an organisation, Siemens Energy believes that innovation in cyber security is an area that companies must invest in. It is therefore building specific expertise and systems in this field through a new department.

Florian Ammerl is one of the company's cyber innovation managers spearheading the department. Explaining the need for innovation, he said: "Innovation and cyber security are not a well-known couple in the energy industry. But with both quantity and quality of risks rising as a result of a more and more digitalised world, the urgency to combine those two disciplines is greater than ever."

Cyber security is often viewed in terms of risk, and in the energy sector – perhaps the most critical infrastructure – the stakes are high. But where there is risk, there is also opportunity. Siemens Energy sees cyber security as an opportunity to actively support front-end development of its products to secure itself and its customers.

Patrick Popa, who shares the task of managing cyber security innovation, said: "We see high growth potential from a market perspective, which drives our focus when it comes to strategy. We want to take a proactive approach by identifying new market trends and new technologies. One of our main goals within our cyber security innovation department is to address those questions; to scan trends and technologies that might make today's technologies obsolete in the future."

Ammerl and Popa cited blockchain and artificial intelligence (AI) as examples of two increasingly prevalent technologies that are impacting almost every industry. They explained how this influences their business, i.e., how Siemens Energy conducts business internally and with customers and how it reacts.

"This is what we mean by our proactive approach. It's about identifying these technologies and preparing for them before they impact the way we do business," said Popa. "For example, blockchain or machine learning are technologies that present new fields of cyber threats on the one hand but also enable us to be proactive and to think of new business opportunities on the other. Through our lens, new technologies offer risk and opportunity at the same time."

Taking an organised approach to cyber security innovation is not straightforward, though. To structure the way they are driving innovations, Popa and Ammerl firstly created three main activity streams, perfectly tailored to the organisation's culture:

- *Trend Management* to scan upcoming trends and convert them into meaningful projects
- *Collaborations* to further enable Siemens Energy by leveraging outside knowledge & solutions
- The *CYBER LAB* as a place to execute product and process innovation.

"Conducting innovation projects requires investments, therefore we need to know if it has value or not. As trends are the first thing indicating a market movement or technology shift, it came natural to us that trends should be the initiator for anything we do," said Ammerl. "This demands proper trend management and using identified trends along with broad experience of internal employees to guide various innovation activities. Of course, not every trend has a high strategic value to us. This means that we carefully analyse every trend and filter down to the most important ones. Those that have a high value to us, are called 'focus fields'."

Popa added: "Those focus fields allow us to start activities with internal and external partners that have a direct impact on our cyber security strategy. All activities around a focus field serve the purpose to explore it further. This includes piloting start-up solutions or research projects with universities."

Ammerl says innovation and cyber security are not "a well-known couple" in the energy industry

Popa says Siemens Energy wants to take a proactive approach by identifying new market trends and new technologies

For each focus field, the ultimate aim is to create ideas or innovation projects. However, there are a significant number of different steps before an idea evolves into an innovation project. For this, Siemens Energy has the CYBER LAB, its place of innovation project execution. It is where it executes those ideas and projects – either to success or failure.

"There is a pool of ideas that we have to manage, orchestrate and execute," said Popa. "It's about coming from a very fuzzy front-end to a clear innovation execution process within the CYBER LAB."

Ammerl added: "In our CYBER LAB we cannot and should not be the ones to do the entire work – from scouting trends to the very end-point of implementing cyber security solutions in our products. So, there are several interaction points within the CYBER LAB to conduct projects together with experts in cyber security, who can really support in bringing projects to life."

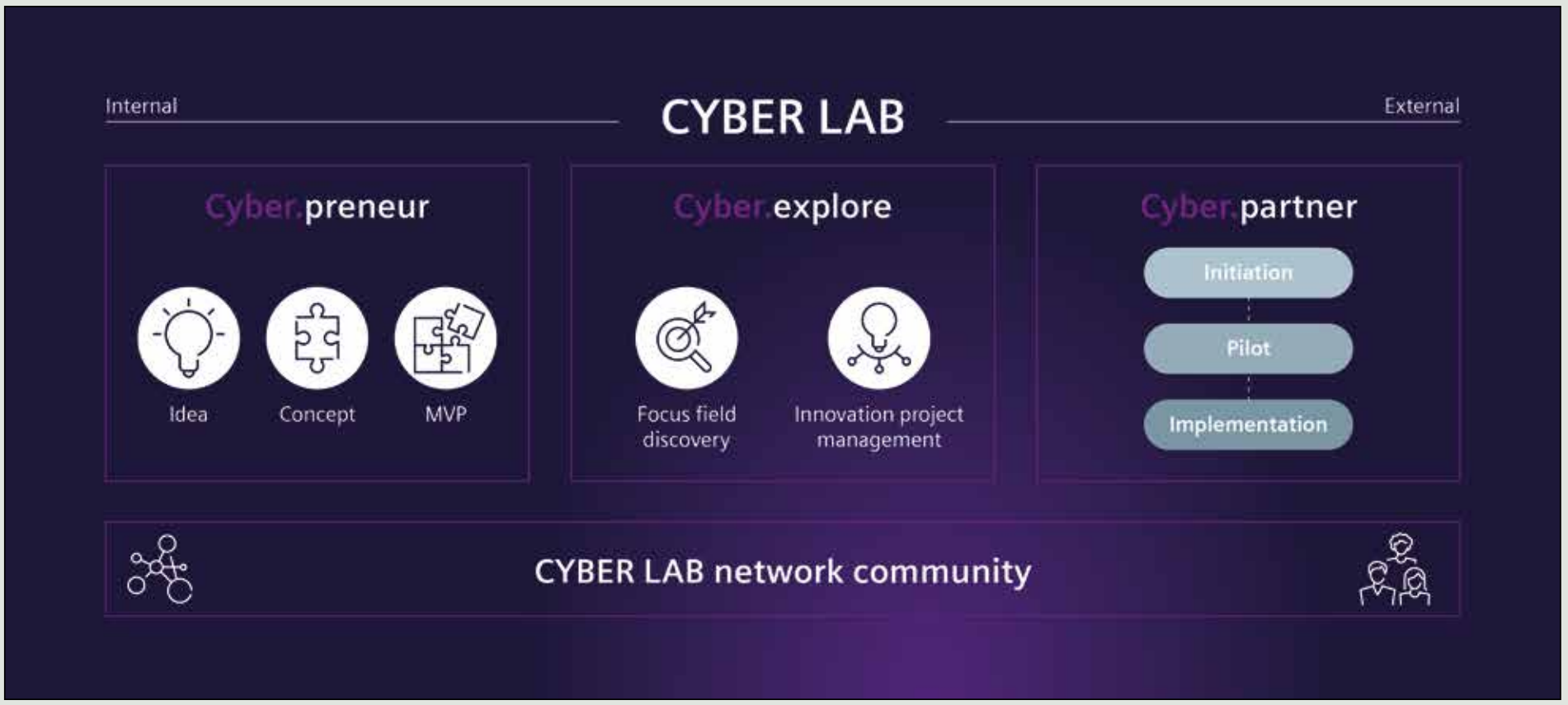
Siemens Energy stresses the importance of working together. While there are always issues surrounding confidentiality, it says that "true collaboration" within the industry across borders and regions is key.

Popa said: "This is where our third activity stream 'Collaborations' really pays off. We are trying to shape our cyber security innovation ecosystem with internal and external partners. Therefore, we are always looking for strategic partners to support us in elaborating identified trends or experiment on new ideas within the CYBER LAB – whether from internal sources, academia, government organisations or start-ups. So, this is where our thoughts and activities are focused on for the next year."

To manage all the different activities, Ammerl and Popa needed a platform which helps them to orchestrate and visualise the innovation work. For this, they came up with the concept of the cyber security 'Orbit'. In essence, the Cyber security Orbit is a platform where the three activity streams are initiated, executed, monitored and controlled. "Whether it is a trend, a project with a start-up or a CYBER LAB project, the Cyber security Orbit is the digital replica of what we're doing," explained Popa.

Ammerl added: "Through our internal network we started to realise, that we're not the only ones in Siemens Energy to seek a digital solution in scanning for trends, orchestrating projects and to increase transparency. Therefore, we joined forces with the Corporate Innovation, the Digitalisation, and the Finance teams to realise a bigger-scale Orbit for anybody within Siemens Energy who is trying to do the same.

"We all wanted to increase transparency, grow the big data percentage on which we base our work on, and we also wanted to lead innovation campaigns and activities. By teaming up, we're operating in what we call the Orbit Ecosystem – a network of different organisational groups with the same focus, which is to increase the transparency and foster the knowl-



Siemens Energy's CYBER LAB is the executive place for intrapreneurs (Cyber.preneur), trend management and execution (Cyber.explore) and Collaborations (Cyber.partner)

edge exchange within the company."

So exactly what is Cyber security Orbit and how does it organise Siemens Energy's innovation process?

Ammerl explained: "In the past, companies initiated their innovation projects often through a 'yes' or 'no' by decision-makers. The potential problem here was that this decision did not have enough data to back it up. By utilising a big data approach, the Cyber security Orbit is helping us now to enrich decisions with even more data and thus increasing the acceptance level of innovation projects. It helps to structure the decision-making process, enrich it with experience of our colleagues and refine it with the strength of big data. It trawls the internet through an algorithm to help us grow our database so we can identify trends relevant to us and start the innovation process."

Based on key words, it browses for items including new cyber security patents, or fields of interest such as blockchain-type security.

"We want to know what are the latest and strongest 'signals', as we call them, in innovation management. These signals could be a news article, patent or anything popping up in the market," said Ammerl. "Those signals are then taken and converted into micro-trends; so the system is giving us a recommendation in terms of what might be interesting for us. This will then be linked to the innovation projects and different experts. This is really the strength of our Cyber security Orbit as it helps us to relate any ongoing project to insights coming from big data."

So far, the system has been working well, says Siemens Energy and, as with any new system, it is being continually adapted and improved to suit the existing culture. The plan is to have several iterations throughout the year to adjust its cyber security objectives and make strategic decisions accordingly.

For all these ambitious activities and goals, the Cyber Security Innovation group needs manpower. The future plan is to further ramp-up the team for driving innovation management in cyber security with more resources. This will be an important addition to the group of experts working in cyber security across Siemens Energy.

Having such a large group of experts is a huge benefit to Ammerl and Popa, whose focus is on paving the way to a cyber-resilient future for the company.

Noting the advantage of this, Ammerl said: "Paving the way for us means, to provide the best possible circumstances for Siemens Energy to drive innovation in the field of cyber security. Making use of those beneficial circumstances is a team effort, for which we need the full support of all our colleagues – not only in cyber security. Of course, this innovation journey cannot be successful without an innovation-friendly culture."

Establishing an innovation culture for cyber security will, however, be a challenge.

Popa noted: "In the end it is all about people. For us the additional challenge is that there was no common understanding of how to do innovation in cyber security at the beginning. Nevertheless, we knew that we have so many great experts and knowledge within our organisation. So it was just a question of how to activate this for our cyber security innovation purposes.

"It's about: how we can work with them; how we can create a network, improve our culture in terms of cyber security innovation. We are creating and shaping our own cyber security network within Siemens Energy with the main objective to break down silos between departments, functions, business units and regions."

Despite the tasks and challenges ahead, Ammerl and Popa remain highly confident of the prospects for the new department and are happy with the achievements across the business.

Ammerl summarised: "We have managed to achieve a lot so far, yet we have still a long way to go to achieve the vision of a cyber-resilient future in this highly volatile world."

Popa added: "The threat landscape is growing every day, and we cannot change that. The question is how we deal with it. Our key message is that we need to focus our cyber innovation to prepare Siemens Energy and its customers as well as we can for this volatile future."

Orbit Ecosystem: the backbone of Siemens Energy's innovation framework

Digitalisation, cyber security risks, constant transformation through innovation, and a changing market environment influence Siemens Energy's cyber security strategy and require constant monitoring. As the digital backbone of all topics related to digitalisation targeting profitability increase, innovation, and cyber security, Siemens Energy's Orbit Ecosystem is designed to strengthen transparency and cross-organisational collaboration to future-proof the entire organisation.

Siemens Energy's Orbit Ecosystem is powered by Itonics, an AI-powered platform combined with a systematic framework designed to steer innovation efforts. It helps companies to identify emerging technologies, trends, and market potential and to translate them into customised growth strategies. With more than 125 experts on five continents, Itonics supports innovation leaders such as Adidas, Audi, BMW, Cisco, Intel, Johnson & Johnson, KPMG, and Siemens Energy.

The new platform acts as a go-to space at Siemens Energy for collecting and enriching all information relating to innovation, digitisation, and cyber security. It allows idea generators, innovators, and experts to drive cutting-edge solution concepts. Besides creating maximum transparency across all functions, this also gives employees at Siemens Energy the opportunity to play an active part in shaping the future direction of their company.

The Orbit Ecosystem is split into three focus areas:

- The Cyber security Orbit prepares Siemens Energy for a cyber-resilient future by allowing teams to scan, analyse, and prepare for new threats and trends;
- The Innovation Orbit channels collective intelligence to create transparency of innovation processes, topics, and ideas;
- The Digitalisation Orbit accelerates digital transformation to generate business.

Axel Bitsch, Senior Digitalisation Programme Management Expert, Siemens Energy, said: "By launching the Siemens Energy Orbit Ecosystem with Itonics, we can leverage our internal expert communities to their full potential and foster transparency, company-wide collaboration, and co-creation."

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Americas

Wärtsilä to deliver grid balancing engines

WEC Energy Group in the USA has placed an order with Wärtsilä for the engines for a 128 MW power plant. The order consists of seven Wärtsilä 50SG gas engines operating on natural gas.

The engines have the capability to start and stop very quickly, enabling them to respond to fluctuations in supply from solar and wind, providing the necessary grid balancing for a reliable supply for Wisconsin's electric grid.

The engines will be delivered in October 2022, with commissioning of the plant scheduled for March 2023.

With this order, Wärtsilä will have an installed base of over 3800 MW in the United States.

O&M agreement for Wärtsilä in Brazil

Wärtsilä has signed an O&M agreement with Termocabo of Brazil for a 48 MW power plant in the city of Cabo de Santo Agostinho, with the agreement coming into effect on June 1st.

The plant has three Wärtsilä 46 engines. The agreement includes performance guarantees regarding their availability and fuel consumption. These enable Termocabo to meet its PPA obligations. The O&M agreement remains in force until the current PPA expires in 2025.

Colombia orders 369 MW from Nordex

Celsia Colombia has placed an order with Nordex for 63 N155 wind turbines with a total of 369 MW for three projects. The orders include a Premium Service contract for maintenance of the turbines for five years, with options to extend by a further five years.

The Acacia II and Camelias wind farms will be built in the Guajira region, and the Carreto project in Atlantico. The Carreto project will use two N155/4.8 turbines, Acacia II will use 16 N155/5.X turbines, and Camelias will employ 45 N155/5.X turbines.

Installation is due to start in Spring 2023. The 63 turbines will be installed on concrete towers with a hub height of 120 m, which will be manufactured locally. Completion is due by the end of 2023.

Azelio wins energy storage order in USA

Azelio has won its first US order for its long-duration energy storage system, the TES.POD, from Handi Stop Market in Fresno, California. Handi Stop will combine two TES.POD units with solar power to meet half of the energy demand at one of its locations.

The combined system, including solar power, will provide 140 MWh annually, representing half of the Handi Stop Market's total energy demand.

Azelio said that the project will serve as a showcase for many other potential applications in the Central Valley region in California, such as EV charging stations, walnut plantations, poultry, egg and dairy farms, wineries as well as local rural communities.

Asia-Pacific

GE to supply steam turbines to BHEL

GE Steam Power will design and manufacture three steam turbines from its Sanand facility in India to BHEL. The turbines will be used in the future nuclear plants at Gorakhpur in Haryana, and at Kaiga, Karnataka, which are being developed by the Nuclear Power Corporation of India (NPCIL).

The $165 million contract is for three turbines for the six units (Gorkakhpur units 1-4 and Kaiga 5&6). The units are 700 MW being developed by NPCIL with Pressurised Heavy Water Reactors (PHWR) being developed by NPCIL with its own nuclear reactor technology.

Frédéric Wiscart, Nuclear New Build Leader for GE Steam Power, said: "Nuclear energy is one of the most dependable sources of carbon-free power providing round-the-clock energy supply without interruption. At GE Steam Power, we are proud to partner with BHEL and to continue to support NPCIL and India in its path to reliable and lower carbon energy future."

Vena Energy orders Siemens Gamesa turbines

Vena Energy and Siemens Gamesa have signed a deal in which Siemens Gamesa will supply its 3.X platform turbines to a 133 MW wind project in Koppal District, Karnataka, India. Siemens will supply 37 SG 3.6-145 wind turbine, with installation expected during financial year 2023.

The blades will be manufactured at Siemens' factory in Nellore, Andhra Pradesh, and the nacelles at its factory on Mamandur, near Chennai in Tamil Nadu.

Monika Rathi, Head of Vena Energy India, said: "We are partnering with Siemens Gamesa for the supply of their 3.6 MW turbines for the Blended Wind Power Project at Gudadur in Karnataka state. We are confident of successfully delivering this project to our host communities of Gudadur by 2023."

Europe

H2-ready gensets for hybrid plant in Italy

Edison Next, a subsidiary of Edison, has ordered two hydrogen-ready gensets from Bergen Engines for the Michelin plant in Cuneo. The trigeneration plant will supply electricity, heat and cooling for the tyre factory.

Bergen Engines will supply two 11.7 MW gas gensets, using a 20-cylinder variant of the Bergen B36:45 engine series. These engines will be able to run on a fuel blend of 10 per cent hydrogen, 90 per cent natural gas.

The gensets will run in parallel with solar PV panels in a hybrid system providing an electrical output of 25 MW. The gensets are planned for shipment in December 2022, and the new Cuneo power plant is scheduled to enter operation in 2023.

Vattenfall calls for offshore turbine supplier

Vattenfall Windkraft has issued a contract notice for the supply and servicing of wind turbines for three offshore wind farm projects off Germany.

The three projects, Vattenfall Atlantis 1, Global Tech II, and Vattenfall Sandbank 2, are located in the German North Sea.

The contract is expected to be carried out between May 2025 and December 2027 and comes with extension options.

Interested parties have until 19 July to respond to the contract notice.

SSE receives bids for pumped storage project

SSE Renewable announced at the start of June that it has received bids for the main construction works for the Coire Glas hydro pumped storage project with a 1.5 GW capacity in the Scottish Highlands.

SSE will now select a preferred supplier for the mechanical and electrical works and two supplier for the civil engineering scope. This will be followed by a ground investigation programme from July 2022 to Autumn 2023 and the selection of the preferred civils bidder in autumn 2023. Construction is then expected to begin in 2024.

SSE Renewables said the invitation to tender has drawn global interest. The bidders shortlisted for mechanical and electrical plant scope are a partnership between Andritz Hydro and Voith Hydro, and GE Hydro France. The parties shortlisted for the civil engineering scope include three consortia and Strabag UK. The consortia are made up of Bechtel, Acciona Construccion and Webuild; BAM Nuttall, Eiffage Genie Civil and Marti Tunnel; and Dragados and BeMo Tunnelling UK.

Nordex wins order for wind turbines from Serbia

Nordex has received an order for 105 MW from Serbia, its first order from that country. Nordex will supply 22 N149/4.X wind turbines for the Krivaca wind farm in Spring 2023. The order also includes a 25-year service agreement for the turbines.

The Krivaca wind farm was developed by Ivicom, and will be operated by the Serbian MK Group and the Slovenian ALFI Green Energy Fund.

The project will be installed in the area of the municipalities of Golubac, Kucevo, and Veliko Gradiste in eastern Serbia. It will be the first wind farm in eastern Serbia.

Nordex will supply the N149 turbines in the 4.8 MW operating mode. Commissioning is scheduled for the end of 2023, after which Krivaca will generate 310 GWh annually.

Scottish offshore wind project for Siemens

Siemens Gamesa has been awarded an order for 60 units of its SG 14-222 DD offshore wind turbines at the Moray West offshore wind power project in the Moray Firth in Scotland. The wind turbines will each have a 14.7 MW capacity. There is also a service agreement for the 882 MW project.

The Moray West project will be 22 km from the coast in the northeast of Scotland. Installation of the turbines is scheduled for 2024, with first power produced also in 2024.

All of the 180 blades will be produced at Siemens Gamesa's offshore blade factory in Hull, England.

Each SG 14-222 DD offshore wind turbine will have a capacity of 14.7 MW, with a rotor diameter of 222 m using 108 m long blades.

Vestas secures EnBW offshore wind order

Vestas Wind Systems has signed a conditional agreement with Energie Baden-Wuerttemberg (EnBW) to supply turbines for the 900 MW He Dreiht offshore wind project in Germany. Under the terms of the deal, Vestas will supply 64 units of V236-15.0 MW wind turbines for the project, which will be located in the North Sea.

Cadeler will transport and install the wind turbines.

Installation works are due to start in Q2 2025, with complete commissioning scheduled for Q4 2025.

German solar plant order won by BayWa r.e.

A contract to supply 380 000 solar modules for a 214 MW power complex in the Eifel region of Germany was won by BayWa r.e. The project, developed by Enovos Renewables and partners, comprises 11 solar plants. SE (Schoenergie) is general contractor responsible for the planning and construction of the power plants. Construction of the facilities is due to start in June 2023, with commissioning planned for the end of 2023.

International

GE to upgrade Al Taweelah turbines

Emirates Global Aluminium (EGA) has signed an agreement with GE for the upgrade of four existing GE 9F gas turbines at EGA's Al Taweelah power plant.

GE's Advanced Gas Path (AGP) upgrade on the four 9F gas turbines will include hardware and software improvements to drive operational flexibility and increase output, efficiency and availability. GE will also implement the "Live Outage" concept for the first time globally on its 9F fleet. Live Outage is a digitised platform that replaces the paper-based approach, speeding up the outage process.

The upgrade will increase the power output from the four turbines by up to 72 MW for the same amount of fuel consumed.

Under the terms of the service agreement, GE will provide repairs, maintenance, and parts for ten 9F gas turbines, ten generators, and other equipment at the plant.

Saudi-Egypt grid contract for SNC-Lavalin

SNC-Lavalin has been awarded a four-year project management office (PMO) and engineering design review services contract by the Saudi Electric Company and the Egyptian Electricity Transmission Corporation to support the Saudi-Egypt power grid project, the Middle East and North Africa region's first large-scale HVDC interconnection.

SNC-Lavalin will supervise the design and execution of the project, and supervise contractors throughout the engineering, construction, and commissioning phases.

The interconnection will extend 1300 km from Cairo, Egypt to Madinah, Saudi Arabia, with an intermediate point located in Tabuk, Saudi Arabia. Because the countries use different electricity network frequencies, the interconnection will use HVDC to control the power flow in either direction.

Once complete, the $1.8 billion Saudi-Egypt Interconnection project will allow the two countries to exchange up to 3 GW of electricity at peak times.

First hybrid wind/solar project in Turkey

Sertavul has chosen GE and Inogen to build one of the first hybrid wind and solar power projects in Turkey. The plant is composed of a 32 MW wind farm commissioned in 2020 that will be integrated with a 30 MW solar plant.

Adding solar power to the wind farm will enable a higher overall capacity factor and availability for the plant.

Inogen will perform site activities and deliver the sun tracking systems that will help increase the total energy production of the power plant.

GE will deliver seven FlexInverter solar power conversion units. This will be the first installation of the 4.7 MW solar power conversion units worldwide.

Hydrogen

US funds hydrogen project in Utah, new investments in Australia, South Korea

The nascent hydrogen industry is seeing more investment by the week. Despite the alarm over the price of oil and the quest for short-term solutions, hydrogen projects continue to receive financing that keep the energy transition moving ahead.

Gary Lakes

The US Department of Energy (DOE) has provided $504.4 million in loan guarantees for the Advanced Clean Energy Storage (ACES) project in Utah, the first time that the DOE's Loan Programs Office (LPO) has provided financing for clean energy technology since 2014. The action by the DOE is viewed as a firm confirmation of US President Joe Biden's policy to make advances in transiting to a net zero energy future.

The loan will cover the cost incurred by Mitsubishi Power Americas and Magnum Development in the construction of what will be the largest clean hydrogen storage facility in the world.

The project will use 220 MW of alkaline electrolysers that will use renewable energy to produce zero-carbon hydrogen which in turn will then be stored in two salt caverns that have a combined capacity of 9 million barrels, or the equivalent of some 150 GWh for each cavern.

ACES will capture excess renewable energy when it is most abundant, store it as hydrogen, then deploy it as fuel for the Intermountain Power Agency's (IPA) IPP Renewed Project, which currently operates as a 1800 MW coal fired plant. The IPP will in 2025 upgrade to an 840 MW hydrogen-capable gas turbine combined cycle power plant. Initially, the plant will run on a blend of 30 per cent green hydrogen and 70 per cent natural gas starting in 2025 and incrementally expand to 100 per cent green hydrogen by 2045.

"This step creates a path to accelerate the long-term hydrogen market and clean energy landscape to expand decarbonisation across the United States," Michael Drucker, Senior VP of Hydrogen Infrastructure for Mitsubishi Power said in a statement.

"The long-duration energy storage capability of the salt caverns will help improve resource adequacy and decrease costs by capturing excess renewable power when it is abundant and dispatching it back on the grid when it is needed," the company statement said.

Australia is also beginning to move into clean hydrogen storage. BP announced in June that it will take a 40.5 per cent share in the Asian Renewable Energy Hub (AREH) and become the project's operator.

Located in Western Australia, the project is expected to produce some 1.6 million tons of green hydrogen or 9 million tons of green ammonia annually generated by solar and wind energy amounting to 26 GW.

It is yet to be determined how much of the energy will be stored or provided immediately for industrial use. The facility will also produce green ammonia. Both hydrogen and ammonia will be available for domestic use and export.

Meanwhile, South Korea's LG Chem Ltd announced last month that it will build a blue hydrogen plant with a production capacity of 50 000 tons annually. It plans to start construction at the Daesan complex on the country's western coast during the first half of 2023 and have the plant ready for operation by the second quarter of 2024, the company said in a statement.

The plant will be the first by LG Chem that produces pure hydrogen, besides the hydrogen byproducts that come from the company's petrochemical facilities. The new plant will use the methane produced at the LG Chem naphtha-fed steam cracker as feedstock for hydrogen.

The hydrogen produced at the plant will be returned to the naphtha-fed steam cracker and used as its pyrolysis fuel in order to reduce 140 000 tons per year of carbon emissions, the company explained in its statement. The cracker at Daesan produces up to 1.27 million tons per year of ethylene and 650 000 tons per year of propylene.

LG Chem said it intends to produce blue hydrogen by capturing the carbon dioxide emitted in the process of producing hydrogen from methane. Blue hydrogen is produced from fossil fuels when the carbon dioxide emissions are captured.

Hydrogen is being taken very seriously by the South Korean government and businesses. The country plans to make hydrogen the source of one-third of its energy by 2050, which will make it the most widely-used energy source gas throughout South Korea by that time.

The government is investing substantially in hydrogen projects and encouraging the private sector to do the same. During fiscal year 2021, the government spent $702 million on hydrogen projects, and during that time, $2.3 billion was promised for the establishment of a private-public hydrogen-powered fuel cell electric vehicle market by the end of 2022.

Five South Korean conglomerates jointly announced last year that they would pursue research and investment into hydrogen and would invest $38 billion in it by 2030.

Gas

Qatar embarks on North Field expansion with huge contracts for IOCs

Last month, Qatar cemented its economic future to natural gas and exports of liquefied natural gas by contracting oil majors for a role in expanding LNG production, ensuring that the Gulf state will be capable of supplying the world with LNG up to 2050 and beyond.

Gary Lakes

Qatar is gearing up to solidify its role as the world's largest supplier of liquefied natural gas (LNG) with the launch of plans to expand development of the North Field, the single largest non-associated gas field on the globe.

During June, QatarEnergy, the state-owned company that oversees all of the emirate's energy projects, signed joint venture agreements with TotalEnergies, Eni, ConocoPhillips and ExxonMobil cementing the participation of these international oil companies (IOCs) in a gas extraction and processing endeavour that will see Qatar's LNG production capacity go from 77 million tons per year (t/y) at present to 110 million t/y by 2025 and then 126 million t/y by 2027.

Since the advent of climate change consciousness, Qatar has started to bill itself as 'your partner in energy transition'. There is no doubt that natural gas is going to be needed as the planet shifts to a net zero carbon emission existence, and if Russia is indeed eventually shut out of numerous energy markets because of its political actions, then Qatar will be an alternative that both Europe and Asia can access reliably.

While the production volumes that Qatar plans to export by the end of this decade will not entirely cover the natural gas that Europe imports from Russia, Qatari LNG supplies will meet a large part of future EU gas demand and enable a number of fuel source buyers to cut the use of coal, which in light of Russia's invasion of Ukraine, has seen a resurgence despite moves to weed it out of the energy chain.

A number of EU countries have approached Qatar for increased supplies of LNG as they turn away from Russian gas. But QatarEnergy is already producing at overcapacity and is unable at this point in time to meet the new requests. Qatar has been able to juggle shipments in order to help the UK, but has said it will not tap into contracted supply agreements with Asian customers to meet these new European requests. For Germany, Qatar has signed an agreement of intent to ship LNG from its new, jointly-owned LNG export facility in Texas, Golden Pass, to Germany in 2024. QatarEnergy holds 70 per cent of the project and ExxonMobil holds the remaining 30 per cent. The facility is to have three trains and produce up to 18 million t/y.

Qatar prefers to deliver LNG under long-term contracts, but Germany is moving solidly towards renewables and is looking for shorter-term deals. All this is being negotiated, but one option is for Germany to take in the Golden Pass LNG and then ship it on to landlocked Central European countries that do not have access to LNG ship deliveries.

Even if all of Golden Pass production arrives in Germany, in the short-term it will not be enough to offset the average of 45 bcm/year that Germany receives from Russia (approximately 33 million tons of LNG).

Qatar in 2017 decided to lift its moratorium on further expansion of the North Field and embarked on considering its expansion options. In 2019 it began to put the plan together culminating with the signing of contracts last month. The first phase of North Field Expansion (North Field East) will require some $28-30 billion in investment for four trains, a further two trains will be built in phase two (North Field South). QatarEnergy said its partners in phase two will be drawn from those that were selected for phase one.

The joint ventures established by QatarEnergy and the IOCs gives each of the companies a 25 per cent stake in one of the four trains that will be built and that together will boost LNG output by 32 million t/y. QatarEnergy will hold 75 per cent.

Speaking in Doha during the course of signing the joint venture agreements, Saad Sherida Al Kaabi, the Minister of State for Energy Affairs, and the President and CEO of QatarEnergy, said that Qatar would soon announce a new solar power project and a new major petrochemical project.

Al Kaabi said the North Field South expansion was in its final stages of engineering and that tenders would be awarded during the first quarter of 2023. Combined with North Field East, investments will amount to more than $50 billion, he said, adding that Qatar has previously announced early site works for a petrochemical project worth some $8 billion with Chevron Phillips Chemical.

The minister said in considering all the projects that QatarEnergy has planned, including the electricity sector, there will be investments totalling $80-100 billion over the next seven years. "And after all this construction is over, it will greatly enhance the GDP of the country with total revenue received," he said.

The North Field lies in the centre of the Persian Gulf and Qatar shares it with Iran, which calls its portion of the field South Pars. The entire 9700 km^2 resource is estimated to hold 1800 trillion cubic feet (tcf) of natural gas and 50 million barrels of condensate.

Expanding hydrogen

A white paper recently published by Siemens Gamesa outlines why affordable, domestically produced green hydrogen is crucial to Europe's energy security strategy. At a webinar marking the report's launch, a panel of experts discussed how to accelerate its use in driving energy independence while keeping an eye on the climate crisis. **Junior Isles** reports.

The geopolitical upheaval of the last six months has painfully highlighted the overarching importance of energy security and the need to drastically reduce dependence on imported fossil fuels. Moreover, the ongoing war in Ukraine has shown that accelerating up and scaling up the production of renewable energy in Europe, for European use, needs to start happening now.

With more renewable energy in the system, Europe can start to not only decarbonise direct power markets but, through the use of green hydrogen produced from renewables, also secure the supply of zero-carbon fuel for heavy industry, mobility and agriculture.

A recently released white paper produced by wind turbine manufacturer Siemens Gamesa outlined how an expanded renewable energy sector within Europe is fundamental for energy security, and the need to in particular accelerate and ramp up onshore and offshore wind production across Europe to drive green power-to-hydrogen.

Hydrogen produced from wind is a must, says the report, arguing that any delay in starting work on the green hydrogen ecosystem reinforces the reliance on imports and continues to expose the European Union and its Member States to the volatility of energy pricing, supply disruption and geopolitical insecurity.

The success of advancing power-to-x opportunities, however, relies on the underlying systems and infrastructure that can support the change. Increased production of wind energy also needs to be aligned with increased storage capacity across Europe to manage and ensure supply, and to ensure grids can be stabilised.

Speaking at a webinar to launch the publication, Juan Guiterrez, CEO, Service, Siemens Gamesa, said: "It is obvious that we cannot achieve the necessary volumes of green hydrogen required to decarbonise sectors such as transport, heavy industry and manufacturing unless the volume of wind projects is accelerated massively. We cannot wait for organic and incremental changes in consumer behaviour to drive down demand for oil and gas; we need to lead that change.

There was a consensus on the panel that only through a rapid acceleration of renewable energy deployment and continued investment in related technologies such as green hydrogen, storage, infrastructure and hybrid technologies, can governments speed up both European energy independence and tackle the climate emergency.

Yet producing enough hydrogen to replace fossil fuels is a tremendous challenge.

Setting the backdrop for the debate, Gauri Singh, Deputy Director-General, International Renewable Energy Agency (Irena), said: "In our assessment, we believe that hydrogen and its derivatives will form almost 12 per cent of total final energy consumption [by 2050]. Right now it only accounts for about 2.5 per cent, which gives you a sense of the challenge we face in terms of ramping it up for achieving our climate goals.

"Reaching the [climate] targets of the Paris Agreement is clearly going to be one of the biggest challenges we've encountered, and developing enough green hydrogen is part of the huge challenge. Right now we have about 0.5 GW of electrolysers but we need to move to 5000 GW by 2050. In the next two years we are really looking for an investment of about 16 GW to come on line."

Panel members were keen to stress that the climate crisis should remain at the forefront of government minds even during the current energy crisis and deep concerns surrounding energy security.

Paolo Frankl, Head of the Renewable Energy Division, International Energy Agency (IEA), said: "Energy security will be an incredibly important factor but the important thing is not to lose sight of the climate crisis, so that whatever we do is consistent with what we need next. In some cases there will be transitional measures but it's important that they are consistent with the future."

This was echoed by Jim Watson, Professor of Energy Policy, University College London (UCL), who said: "The psychology of governments, particularly when you talk to them about energy security is much more immediate – ministers have crisis meetings and then they have to resign when they get it wrong… Unfortunately climate change doesn't have that same immediacy. It should, but it doesn't."

He added: "In some cases it leads to grey areas in the transition when some countries like the UK say we should look at extracting more oil and gas. Or coal plants are being kept open in a number of countries, etc. So how you manage that transition is really important… or there is a risk of tension between climate and security."

Through its REPowerEU package, the European Commission's has attempted to maintain that balance between accelerating energy independence from Russian fossil fuels and not jeopardising its climate change ambitions.

Notably, the package identifies green hydrogen as one of the levers that can help the continent reduce its dependence on Russian gas. It proposes a hydrogen accelerator to develop infrastructure, storage facilities and ports, and replace demand for Russian gas with an additional 10 mt of imported renewable hydrogen "from diverse sources" as well as an additional 10 mt of domestic renewable hydrogen.

According to the white paper, such developments will incentivise emerging nations to develop their green hydrogen capabilities, in turn creating a more inclusive global energy market.

Commenting on REPowerEU and the challenges to accelerating the use of hydrogen as a means of reducing energy dependence on Russia, Carlos Navas, Senior Manager for Hydrogen Projects, Enagas, said: "REPowerEU is a very comprehensive package but it also needs to be accompanied by a number of measures that make it feasible for companies [to achieve the goals]… There is now a draft directive that clearly states how things will come into place such as specifics on what is green hydrogen. Then of course there are the funding and financing programmes that help pave the way to speed up the transition, which will be a really difficult path to obtain."

Achieving energy security requires buy-in from, and collaboration between governments, industry and investors, as well as support and commitment of civil society. It will call for a level of alignment between European nations.

"First of all we have to make sure the energy independence security aspect does not take away from the environmental objectives. So this [REPowerEU] is looking to build on the 'Fit for 55' package," said Ruud Kempener, Acting Deputy Head of Unit, Renewables and Energy System Integration, European Commission. "When talking specifically about renewable energy and energy efficiency, this is something all member states can do… renewable resources are across all member states.

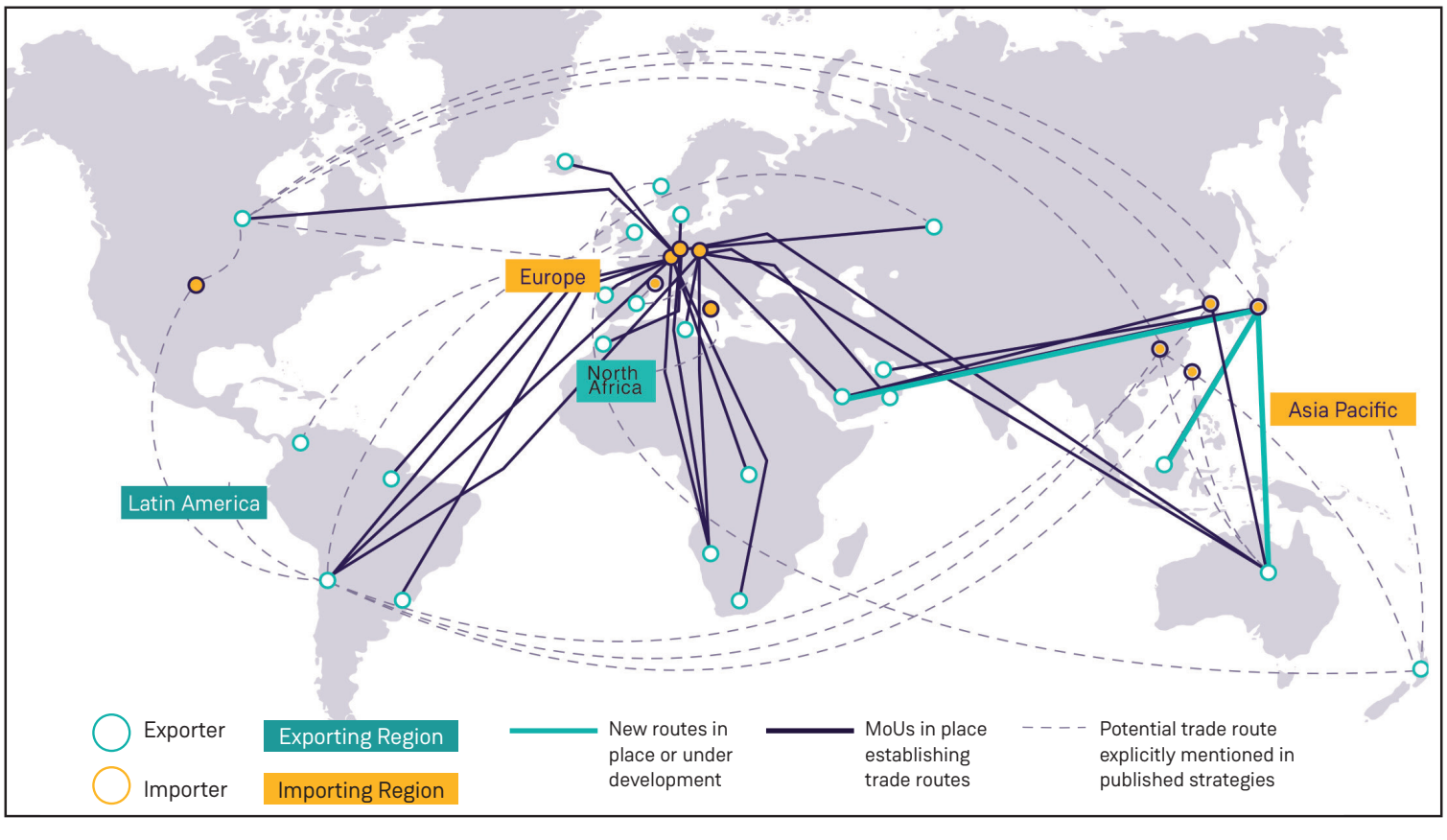
"Of course there are differences. There are some countries that are landlocked and don't have offshore wind; others have large biomass resources. So making this a European project is absolutely critical to make sure we take advantage of all the different aspects. It's important for renewable hydrogen, since there are countries that have a lot of renewable resources which can be converted for those countries that have heavy industry and big demand, and then build the hydrogen infrastructure for a much more regional approach to both climate and energy security."

According to the Siemens Gamesa report, when scale is reached, the end users for the green hydrogen will be the same heavy industries that are responsible for large volumes of today's emissions. It also notes there are potential new markets for green hydrogen-based fuels in heavy transportation, shipping and aviation.

There is an expanding network of hydrogen trade routes, with plans and agreements in place. But the pathway to production and demand will require significant investment in R&D, infrastructure, electrolyser ramp-up.

Summing up what is required for this to happen, Kempener said: "There are bottlenecks and opportunities in both supply and demand. But for me the priority now should be on demand. There's a very clear split in the applications of hydrogen in the long term – in industry versus transport, versus buildings and other applications. But when it comes to the policy drivers right now, the objectives are less clear. So I think the priority is to have predictable demand and markets.

"This can be attained through a mixture of: incentives; mandates; standards to define what is low carbon hydrogen and what is not. But the first two are crucial. For a while, renewable hydrogen will have a price premium, but who pays industry back for this premium, if, for example, they want to compete in the world market for steel? It's a priority for many countries but in particular for the European Union. So the near term priority on demand, is to have clear objectives policy strategies to get there."



An expanding network of hydrogen trade routes, plans and agreements. Source: 'Unlocking European Energy Security' White Paper. Based on IRENA, report published in January 2022. Additional MoUs have been announced since then.

Could grids of the future provide the path to an equal society?

Employing smart grids and a data-first approach can help infrastructure owners deliver sustainability for all by creating an energy system that is reliable, resilient and sustainable. Schneider Electric's **David Hall** explains.

Smart grids have been in the headlines for over a decade. Today we've finally reached an impasse: our existing energy infrastructure is no longer fit for purpose. It is crumbling under the weight of more frequent extreme weather conditions, demand fluctuations, and momentous changes to baseloads (i.e. the minimum electrical current necessary to power constantly running components), historically supported by fossil fuels.

A few short months ago, Storm Eunice wreaked havoc on the UK energy system, leaving many households, hospitals, and businesses grappling with severe power outages. An analysis of international power outages found that some 350 million people were subjected to significant power cuts in 2021 due to extreme weather – 4 per cent of the world's population. Events such as this year's FIFA World Cup, which aims to be carbon neutral for the first time, tend to bring the question of power reliability into the spotlight as Qatar braces for a surge in electricity demand and supply/demand fluctuations.

Hall says "we've finally reached an impasse: our existing energy infrastructure is no longer fit for purpose"

These cases illustrate how dependent our increasingly digital world, cities, critical infrastructure and transportation are on reliable, uninterrupted power. Blackouts grind the developed world to a halt, undermining business continuity, interrupting connectivity, and hindering productivity. As the energy transition towards cleaner energy sources gathers pace, we can already marry this with digital technology to use energy more efficiently and ease the demand on grids. This convergence of electric and digital at scale is known as 'Electricity 4.0' and will be a vital partnership to achieve net zero whilst maintaining a resilient power value chain. These pre-emptive upgrades are essential, particularly as we connect more power intensive IoT devices and electric vehicles (EVs) to the network.

The increasing fragility of existing power grids also highlights our dependence on centralised energy providers and distribution. A relatively small number of producers currently supply all our energy needs. On the other hand, resilient bi-directional smart grids – what we call Grids of the Future – offer a more efficient way to manage energy and the potential to decentralise, decarbonise and stabilise power systems. Smart grids will be able to support a 70-80 per cent decarbonised power generation mix, incorporating additional clean energy from microgrid/solar PV and wind farms. In this way, businesses can be powered towards a net zero future and satisfy their customers and investors demanding more sustainable practices.

In turn, this will enable a prosumer revolution – potentially putting a greater share of the energy supply back into the hands of consumers and businesses, with a (still essential) baseload from larger providers. The combination of increased local power generation capabilities plus digitally enabled remote diagnostics and repairs will provide a smarter, decarbonised, and increasingly resilient 'weather-agnostic' grid.

Global energy demand will continue to grow, driven by population and economic growth. The US Energy Information Agency (EIA) expects it to increase by 47 per cent in the next 30 years. The challenge of sustaining that demand while curbing emissions or, in other words, how to do more with less seems impossible.

We also have robust environmental targets to hit. To reach net zero by 2050, we must halve CO_2 emissions by the decade's end moving 3-5 times faster than current commitments. What might seem like an impossible challenge is possible already with the combination of electric and digital at scale (which we firmly believe is the fastest way to decarbonise the planet).

On the supply side, electricity is the most efficient energy, with almost 100 per cent maximum thermal efficiency. Electricity also makes us more sustainable with an ever-increasing share of renewables in the mix. Balance this on the demand side with digital innovation that enables us to measure and tackle energy waste (vital when considering that around 60 per cent of global energy is today lost or wasted). We have the solutions we need already at our fingertips.

Let's consider, as an example, the rise of EVs. They are 2-3 times more efficient than cars running on petrol or diesel. But we simply cannot deploy EVs at scale to help decarbonise personal transportation without clean electricity and smart decentralised bi-direction digital grids as the foundation. So, with the price of generating energy from wind and solar declining by 40 per cent globally in the past decade, clean electricity is increasingly good for the pocket and the planet.

As the developed world will benefit from decarbonised cities, industry, and transportation with Electricity 4.0, emerging economies will also benefit from a more equal 'playing field'.

Urbanisation in the developing world is rapidly increasing, with more than six billion people projected to be living in urban areas by 2050. Therefore, demand for resilient, low carbon infrastructure is rising. Cities will need to handle the mass adoption of electric vehicles (EVs), electrified public transport and smart buildings supplied with reliable and renewable energy sources and new microgrid technologies.

Renewables offer the opportunity for economic growth to those economies currently living without modern power – roughly 10 per cent of the world's population. Access to energy is a fundamental human right. Reliable, clean power provides a path to a better life and supports access to education, better sanitation, and improved living conditions. It could improve many other services and their penetration, from healthcare to financial inclusion.

Off-grid communities across the globe now have the potential to generate their own solar and wind energy on rooftops, fields, or on water. And where solar panels and wind turbines are connected to a digital grid, they could also have an option to store, share or sell excess energy. Take the Villaya microgrid, for example – an off-grid innovation housed within a shipping container. It offers a mobile, flexible and cost-effective solution for schools, healthcare facilities, and other public buildings to access clean, reliable electricity.

Even more, opportunities could emerge when the sun's power could be harvested and transmitted cross-continentally with the help of 'super grids' – potentially becoming the new 'oil' for some of the poorest countries on the planet – in parts of Africa and Asia.

The case is compelling. More energy from the sun hits the Earth in a single hour than the entire population can consume in a year – all we need to do is harness and use it. Finding a way to connect peak afternoon solar power in a one-time zone to peak evening demand in another could reduce the need for fossil fuelled backup capacity locally and globally.

Resilient infrastructure is a crucial enabler of productivity and economic development. However, climate change and rapid growth in urbanisation have made it even more crucial for governments, municipalities, public infrastructure owners, energy networks, and transport providers to make well-planned investments in smarter, greener infrastructure.

Grids of the future take a powerful holistic approach to power tomorrow's economies while tackling the challenges and pressures placed on energy systems by urbanisation and the effects of climate change. By taking a data-first approach, infrastructure owners can bridge progress and sustainability for all by creating an energy system that is reliable, resilient, and sustainable.

David Hall is VP Power Systems, Schneider Electric UK & Ireland.

Speed record for high-capacity hydropower units

Voith has provided two turbines for the Changlongshan pumped storage plant in Eastern China. The power station has a rated head of 710 m, which is among the highest in China. Most notably, the new units' rated speed of 600 r/min, with a capacity of 350 MW, is a world's first for such high-capacity and high-head units.

The Changlongshan pumped storage hydro (PSH) plant in Anji County, in the Zhejiang province of China, was officially launched by its owner and developer China Three Gorges Corporation in 2006. Sixteen years later, the last of its six 350 MW turbines is entering operation to bring the plant's total installed capacity of 2.1GW.

While a project of this size is always of interest, the technical features of Units 5 and 6 supplied by Voith Hydro are perhaps most noteworthy. In May, Unit 5 successfully passed the 15-day trial operation and was officially put into commercial operation, with Unit 6 following in July.

The station has a rated head of 710 m, which is among the highest in China. The new unit's rated speed of 600 r/min is a world's first for such high-capacity and high-head units and represents a 20 per cent increase on the 500 r/min rated speed of units 1 through 4.

As China continues to ramp up its wind and solar, energy storage plants are becoming increasingly important. The country aims to add enough new PSH plants to more than double its current PSH capacity during the 14th Five Year Plan from 2021 to 2025.

PSH is a type of hydroelectric energy storage that makes use of two water reservoirs at different elevations to generate power as water moves down through a turbine from one to the other.

The fact that it also requires power to pump water back into the upper reservoir means a PSH plant functions like a giant battery as it can store power and then release it when needed.

Bird's-eye view of the Changlongshan pumped storage hydropower plant

Over the last year or so, the Changlongshan PSH has generated 1.3 billion kWh of electricity for the national grid during peak period and used 1.7 billion kWh of electricity to "recharge" during the off season. From its full 2.1 GW capacity, the project can generate nearly 2.5 billion kWh of electricity each year.

The Changlongshan station is considered as a key project developed by China Three Gorges Group (CTG) in the field of pumped storage and marks an important collaboration between Voith Hydro and CTG.

According to Voith Hydro, the performance of Unit 5 received "outstanding feedback" from the owners and experts in the industry.

"The data showed that the unit meets our excellence criteria and thereby proves that the engineering, manufacturing, installation and commissioning of the world's first 600 r/min with 350 MW unit was successful," said Zhang Chengping, mechanical and electrical Chief Engineer at China Three Gorges Group, the plant's operator.

Voith has more than 150 years of experience in hydropower and considers "safe and stable operation" as its primary principle. However, designing and manufacturing machines with such parameters is very complex. Through technological innovation and application of advanced design tools – as well as continuous close cooperation with Three Gorges Construction Engineering Group, East China Survey and Design Institute, China Power Construction 14th Bureau, and other parties – Voith was able to provide a reliable unit that achieves the special performance and quality criteria required for Changlongshan.

In the early stage of the project, Voith Hydro in Germany successfully developed a 600 r/min high-head runner model according to the hydraulic conditions of the project, winning the CTG competitive model test of China Institute of Water Resources and Hydropower Research (IWHR).

Voith has also applied the forging materials with the highest performance level in the world today, among which a one-piece shaft centre-part without rotor rim of the motor-generator represents the "world-class" benchmark for large forging manufacturing. The local engineering team in China worked closely with the German central technology department for the design and conducted many cross-functional design reviews, double-checks and optimisations, laying a solid foundation for the successful manufacturing and operation of the machine.

Site commissioning was the critical stage for verifying the performance of the pumped storage unit. Since there was no similar pumped storage power plant with a rated speed of 600 r/min for reference worldwide, site commissioning faced enormous challenges and uncertainties. Additionally, during the commissioning of Unit 5, Shanghai was affected by a serious Covid epidemic situation. The Chinese Voith entity made enormous efforts to overcome the difficulties, successfully completing the commissioning of Unit 5 within only 28 days.

During this installation process, Voith field engineers performed technical supervision duties. The installation is always a joint effort of the owner, installation company and supervisor in order to ensure the highest installation quality. Important steps in this process are, for example, the spiral case pressure testing and stator and rotor assembly. All of these passed the customer acceptance first time around, reaching and exceeding the "excellent" installation index.

Considering the dimensions of the components with a stator diameter of more than 7 m, it is "remarkable" that the cylindricity of the stator core of Unit 5 was controlled within 0.2 mm, said Voith Hydro. Furthermore, its waviness in the vertical direction was less than 1 mm. In addition, the bearing temperature, vibration/run-out, pressure pulsation and other indicators that reflect the unit operation stability have reached the best level among pumped storage machines.

This project marks another important milestone between Voith and CTG. For almost 30 years, since the construction of the Three Gorges hydropower station in the 1990s, both parties have established long-term cooperative relations in the fields of research and development, manufacturing, installation, operation, maintenance and monitoring of hydropower equipment.

The Changlongshan station is a key project developed by CTG in the field of pumped storage after the Three Gorges, Xi Luo Du, and Wu Dong De hydropower stations. In the future, Voith Hydro will continue to work closely with the China Three Gorges Group to support it in achieving its ambitious CO_2 reduction goals – with clean hydropower.

Model acceptance test for one of Voith Hydro's Changlongshan units in Germany

About China Three Gorges Corporation

Founded in 1993, China Three Gorges Corporation (CTG) has taken full responsibility for the construction and operation of the Three Gorges Project (22.5 GW) and the four large-scale hydropower stations of Xiluodu (13.86 GW), Xiangjiaba (6.4 GW), Wudongde (10.2 GW) and Baihetan (16 GW) located in the upper reaches of the Yangtze River.

CTG is a world leader in the production of clean energy backed by a workforce of 35 000 people and total assets of RMB 698.6 billion ($104.2 billion). The Group specialises in hydropower development and operation, as well as in the development of new energy like wind and solar in China and abroad.

With a total installed capacity of 124 GW, 17.7 GW of which is overseas, CTG has become China's largest clean energy corporation and the world's largest hydropower enterprise, operating in 47 countries with 89 ongoing international contracts and investment projects in Africa, Asia, Europe and the Americas.

Junior Isles

Make best use of what you have

As the cost of living crisis begins to bite, we all have to look at how to make better use of what we have – cut waste and increase efficiencies, whether it is in a household or across an entire industry sector.

At last month's Eurelectric Annual Power Summit, as expected, resilience and energy security were front and centre of discussions. But it was encouraging to see that the electricity sector is also able to focus on how it can make the optimum use of its assets and expertise in tackling the energy crisis while preserving the planet.

The message from the opening keynote was that an accelerated energy transition and electrification can deliver us from both the climate change and energy price crises. As the organisation representing Europe's electricity industry, it was no surprise that second on the list of Eurelectric's recommendations (after "raising the game" on renewable power generation) is "electrify everything that can be electrified".

During the press conference following the morning session, Eurelectic President Jean-Bernard Lévy gave a bit more detail. He noted that the share of electrification has stagnated at around 22 per cent of total energy and called for more rapid deployment of electric vehicles, energy storage and smart charging solutions, heat pumps and electrolysers for hydrogen.

Lévy also expanded on what the organisation cited as another of its key recommendations – strengthening distribution grids. He said that distribution grids would require about €400 billion through 2030 and stressed: "It's not all about solar farms and wind energy; it's also about precision distribution [of energy]."

It is an important point, which Sabine Erlinghagen, CEO of the global Grid Software business, Siemens picked up on later in the conference. "It's about the right investment," she said, noting that software can play a big role in making the most of what we have by utilising the existing infrastructure much smarter.

Certainly there is room for improvement. According to Erlinghagen, losses in the EU power network are between 4 and 17 per cent. She also pointed out that the cost of curtailing renewables is no longer negligible. At the same time, the growth in distributed energy [DE] capacity, especially on distribution grids, is growing exponentially. "We're expecting a 7x growth of DER [DE resources] capacity coming onto the grid through to 2030," said Erlinghagen.

Coping with such growth will clearly call for more copper in the ground and network equipment but Erlinghagen stressed that "hardware alone" will not be enough. "Hardware will cover linear growth but it will not get us the exponential growth. To get to that exponential growth, we have to be smarter by leveraging the power that software can provide."

She said that simulation software, which can help identify technical losses, shows that by reducing these losses by 1 per cent across the EU would save building 10 power plants. "If you look at dynamic line rating, you can transport 30 per cent more power over the same line. It's about using the existing infrastructure that we have smarter." Using automated smart data in a different way can also deliver significant savings, she added.

The issue of efficiency and making better use of what we have is one that is finally being taken just as seriously as the need for more renewables and developing new technologies. Russia's war in the Ukraine has done much to focus minds on upping the game in all areas.

Early last month, the International Energy Agency (IEA) organised its 7th Annual Global Conference on Energy Efficiency in Denmark, bringing together more than 20 ministers from countries around the world.

A new IEA analysis, published to coincide with the conference, underscored the vital role of energy efficiency and energy saving in meeting today's crises by immediately addressing the crippling impacts of the spike in energy prices, strengthening energy security and tackling climate change.

As IEA Executive Director Fatih Birol put it: "Energy efficiency is a critical solution to so many of the world's most urgent challenges – it can simultaneously make our energy supplies more affordable, more secure and more sustainable. But inexplicably, government and business leaders are failing to sufficiently act on this."

Finding efficiencies, however, can and should go beyond particular sectors in isolation. To this end, Eurelectric's recent efforts are particularly noteworthy.

During the summit, it announced the release of a new report called 'Power Plant', which illustrates how the power sector can work with nature conservationists to regenerate biodiversity. At the same time, The Nature Conservancy announced that it was forming a collaboration with Eurelectric to promote the report.

The report argues that electrification, supported by a massive rollout of renewables, can break the cycle of degradation, and help regenerate biodiversity. Eurelectric notes that for too long there has been a siloed approach to tackling biodiversity loss and climate change. "The climate crisis and biodiversity loss are inextricably linked, so we need to tackle them at the same time," it says. "Power Plant illustrates how the electricity industry can support the natural world and regenerate biodiversity through integrated renewable energy projects."

Noting that policies that address both the climate crisis and biodiversity at the same time are more effective, the organisation is looking to ensure that these crises are tackled in an integrated manner. It has therefore set out a legislative timeline through 2025, taking into consideration a broad range of policies – from agricultural to financial, from spatial planning to nature restoration.

The report identifies synergies between renewable power projects and biodiversity regeneration and contains a number of recommendations, which look at RES projects "through the lens of an integrated approach".

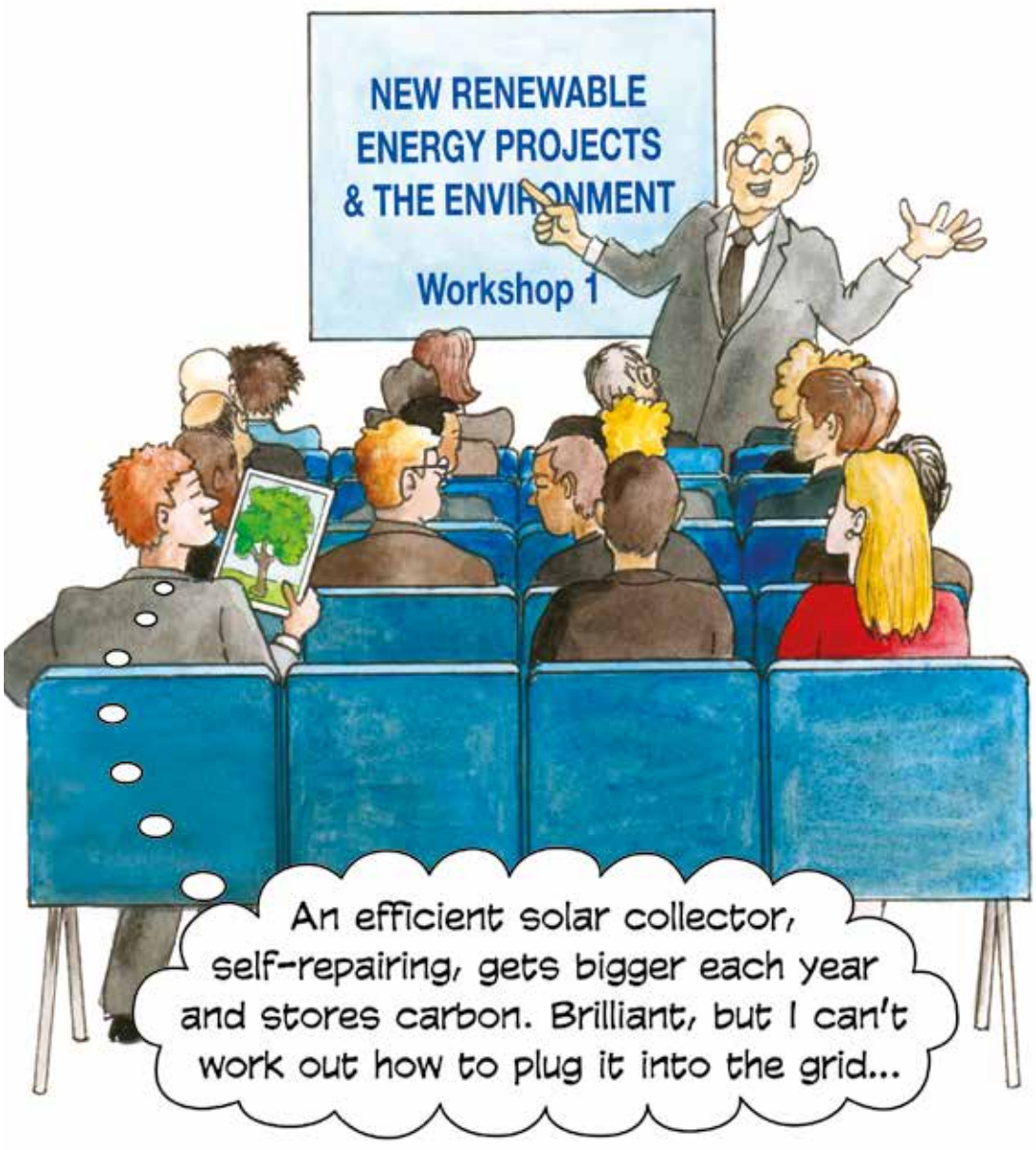
In solar projects, for example, it notes that shading provided by ground-mounted solar panels can keep moisture in the ground longer, thereby helping re-vegetate desertified land. Such synergies, however, are currently not exploited due to policy and regulatory barriers such as a lack of definition of "agrivoltaics" at EU level, and lack of incentives for farmers and RES developers to deploy agrivoltaics. Among a number of recommendations to accelerate such projects is to allow for co-financing of integrated solar projects – for instance by combining agricultural subsidies, PV support schemes, and innovation grants.

Commenting on the report, Kristian Ruby, Secretary General of Eurelectric, said: "Climate change and biodiversity loss can be tackled simultaneously. Our industry has the means to reduce the ecological loss and go even further: restore nature. This is also a call to remove all barriers to speed and scale up the deployment of renewable power plants."

This last point was one of hot debate at the conference. According to Eurelectric, around 500 GW of new renewable capacity is needed, equal to about half of existing European total generation capacity, to cut EU CO_2 emissions by 55 per cent by 2030. Yet, the average permitting time for new installations, it says, is four to six years.

Jochen Hauff, Director Corporate Strategy, Energy Policy & Sustainability, BayWa r.e. AG, who's company has been combining renewable energy and agriculture for several years, questioned how Europe was going about accelerating projects. In particular he was strongly against the proposed terminology of "Go-to Zones" to identify areas where projects could be rapidly permitted and built.

In the Q&A following the debate, one journalist colleague suggested they could simply be called "Acceleration Zones", a suggestion well received by all with no objections. Now all we need is similarly speedy permitting of projects, with agreement between cross-sector stakeholders taken in the way seen in that moment. If only life could always be so straightforward.



Cartoon: jemsoar.com