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Trump victory could slow US energy transition



Former President Donald Trump could take the US down a different energy path

A recent report by Wood Mackenzie has outlined how the US energy sector's low carbon drive will be impacted if former President Donald Trump regains office. **Junior Isles**

A victory for former President Donald Trump in the November 2024 US election, combined with long-standing issues around the US relationship with China and US government deficits, could significantly alter the path of US energy policy and usher in a delayed transition scenario, according to a new Horizons report from Wood Mackenzie.

The US Infrastructure Investment and Jobs Act (IIJA) of 2021 and the Inflation Reduction Act (IRA) of 2022 catapulted the US to global leadership in decarbonisation but this could all change if President Joe Biden's Democratic party loses to the Trump-led Republicans in what looks set to be a closely fought contest.

While investments in technologies that support the energy transition and low carbon technology may decelerate, the opposite effect might take place for fossil fuels, which could see

expanded investment and push out peak fossil fuel demand, according to the report, 'Hitting the brakes: how the energy transition could decelerate in the US'.

"This election cycle will really influence the pace of energy investment, both in the next five years and through 2050. Investments in low carbon supply need to be made in the near term to realise longer-dated decarbonisation targets. US carbon emissions could grow, putting net zero out of reach in our delayed transition scenario," according to David Brown, Director of Wood Mackenzie's Energy Transition Research.

"It is not likely that the IRA will be fully repealed," said Brown. "However, a second Trump presidency would likely issue executive orders that would abandon the 2035 net zero target for the power sector, establish softer emissions goals from the EPA,

and issue tax credit regulations that could favour blue hydrogen."

Brown added that the fiscal environment may prove challenging as well, as US government spending could be limited to address the country's debt burden – the US Congressional Budget Office expects the US debt-to-GDP ratio to reach 109 per cent by 2030 and hit 155 per cent by 2050.

Wood Mackenzie's base case projects about \$7.7 trillion in investment for the US energy sector over 2023-50. However, in the delayed transition scenario in the US, less policy support for things such as low-carbon energy and infrastructure improvements decreases investment for the US energy sector by \$1 trillion compared to the base case.

Total capital investment for the US includes upstream oil and gas, power generation, power grid and EV infrastructure, hydrogen and CCUS. Some

\$11.8 trillion dollars in capital investment in US energy is required on a cumulative basis from 2023-2050 to reach Wood Mackenzie's net zero scenario. Investment is 55 per cent lower in its delayed transition scenario.

According to the report, where policy support for low-carbon energy is cut back, CCUS and low-carbon hydrogen would face a slower investment pathway. Total US natural gas demand would rise to be 6 billion cubic feet per day (bcfd) higher than the base case by 2030 – a jump of some 6 per cent.

"It is important to note that peak fossil fuel demand does occur – it is just around 10 years later than the 2030 prediction in our base case," said Brown. With a peak still on the horizon, companies will need to continue diversifying into low carbon technologies to build a business model that is

Continued on Page 2

US to overhaul transmission planning as electric grid strains

The US Federal Energy Regulatory Commission (FERC) adopted comprehensive new rules to reform the country's build-out of long-distance power lines, as rising electricity demand poses a threat to domestic grid reliability.

Last month FERC voted 2-1 in a partisan split to require operators to come up with plans for long-term transmission construction and cost allocation. The move represents the largest overhaul of transmission system rules since 2011.

The decision was cheered by clean power groups but blasted by a conservative commissioner who said it was driven by "special interests" and

exceeds the commission's authority.

FERC's final rule – intended to prompt utilities and grid operators across the country into more forward-looking, comprehensive and cost-effective planning of large electric transmission lines and better account for the broad benefits those wires provide – was nearly three years in the making. In the end it passed on a 2-1 vote, with the commission's two Democratic appointees voting yes and the lone Republican opposed.

FERC Chairman Willie Phillips said an ageing grid, increasing severe weather, demand growth from new manufacturing, data centres and

increasing electrification as well as a changing power generation mix all threaten reliability at a time when construction of the high voltage transmission lines that help get power to where it's needed has slumped to a record low.

The rule requires power transmission operators to conduct transmission planning at least every five years, looking out along a 20-year horizon using "best available data to develop well-informed projections" of needs, according to a FERC staff presentation.

"This rule cannot come fast enough. There is an urgent need to act to ensure the reliability and the affordabil-

ity of our grid," Phillips said. "We simply will not be able to address these converging challenges and continue to supply the reliable, abundant and affordable power the American people depend on without taking a clear-eyed, long-term, forward-looking approach to transmission planning."

But Commissioner Mark Christie, a conservative former Virginia utility commissioner, vehemently dissented to the rule, calling it "a pretext to enact a sweeping policy agenda that Congress never passed" and one that will "facilitate a massive transfer of wealth from consumers to for-profit special interests."

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resilient through the energy transition. Each sector, from transport to power and emerging technologies, will be affected by a nuanced set of drivers.”

With less financial support from the Department of Energy Loan Program Office, fewer grid improvements, and continued trade tension with China, the delayed transition scenario for the US projects that wind and solar and energy storage capacity would be about 500 GW by 2050, 25 per cent lower than the base case.

Coal would remain in the mix for longer. In the delayed energy transition scenario, the pace of electrification would ease in the near term. However, industrial, residential, electrolytic hydrogen and EV usage would still combine to increase power demand by 2000 TWh, a 45 per cent jump from 2030 to 2050. With less policy support for renewables and continued load growth, there would be no way out of using coal, says the report. As a result, by 2040, coal generation capacity would be four times higher than the base case, with 104 GW on the system.

The report also notes that the lack of federal demand-side targets, reductions in federal funding and cost inflation would challenge the investment case for low-carbon



Brown: A Trump presidency would likely abandon the 2035 net zero target

hydrogen. Eligibility for tax credits under the IRA could be adjusted to tilt incentives towards blue hydrogen. Near-term growth shifts to export markets in Europe and Asia; Wood Mackenzie's delayed transition scenario would still foresee a two million tonne export market emerging by 2050.

A look at state-level policies shows that momentum for low-carbon investment can be independent of federal policy. Since 2020, California's utility-scale battery capacity has expanded eight-fold to 8.4 GW. By the end of the year, Wood Mackenzie expects battery capacity to reach 11.7 GW.

State-level renewable portfolio standards and voluntary renewable energy targets supported wind and solar capacity expansions of over 13 per cent a year on average between 2016 and 2020, during the last Trump administration. California's Low Carbon Fuel Standard (LCFS) will help underpin investments in low-carbon hydrogen, direct air capture (DAC) and bioenergy across the country.

“A slower transition scenario for emerging technologies does not mean the story is over,” said Brown. “The emerging technology sector in the US will need to reassess costs, project sizes, and subsidy reliance. This should be approached through a position of confidence. The US has a track record of innovation – the US went from a net LNG importer to the world's largest LNG exporter over the last decade.”

Updated EU package will accelerate renewables roll-out

On the second anniversary of REPowerEU, the European Commission has launched a new package to speed up the deployment of renewables as it looks to eliminate its use of Russian gas. **Junior Isles**

The EU last month introduced a new package to support renewables' roll-out – exactly two years after it launched the REPowerEU package, the bloc's effort to wean itself off Russian gas.

The European Commission adopted a series of new and updated recommendations and guidance documents in an effort to improve and streamline permitting procedures and auctions for renewables. These documents will help to implement the EU framework for renewable energy by improving the conditions for a rapid deployment of renewable energy. By boosting demand for clean technologies made in Europe, this initiative will also help reinforce industrial competitiveness, increase the resilience of the energy system, and deliver on the European Green Deal.

Commenting on the new initiative, Kadri Simson, EU Commissioner for Energy, said: “Increased predictability and faster permitting are key to sending the right investment signals across the renewable energy value chain. Today's guidance from the Commission will help member states

to accelerate the deployment of renewables. As we approach two years since the adoption of the REPowerEU Plan, it is important to give this extra boost to home-grown clean energy sources, to allow us to replace even more Russian fossil fuels.”

In the updated Recommendation on speeding up permit-granting procedures and its accompanying guidance, the Commission highlights ways to improve planning and permitting procedures for renewable energy and related infrastructure projects in the EU. The updated permitting guidance provides examples of good practice on faster and simpler permit-granting procedures, highlights the importance of digitalisation and community participation, human resources and skills; and outlines how to best handle site selection procedures and network connections.

The Commission has also adopted a further guidance document on designating renewables acceleration areas. Under the revised Renewable Energy Directive, these are locations where the deployment of renewable energy

projects is not expected to have significant environmental impacts and the necessary procedures are therefore fast-tracked to ensure quick deployment of specific technologies. Key elements for selecting such areas are the availability of digital tools for planning and mapping, and data on the renewable energy capacity and on the potential environmental impact. In its guidance, the Commission also highlights the role of proper stakeholder engagement and public consultation to facilitate a successful designation of such acceleration areas.

Auctions play a key role in the roll-out of renewable energy and, when well designed, can be supportive of the steady and sustainable growth of the EU economy. By outlining standard elements for the design of auctions for renewable energy, the Commission's recommendation and guidance will make these procedures more harmonised and efficient, in line with the Net-Zero Industry Act.

The news was welcomed by the solar and wind sectors. Walburga Hemetsberger, CEO of SolarPower Europe

said: “In crisis, solar delivered for Europe with record deployment, supported by the EU Solar Strategy, to get the continent off Russian gas... It is therefore good to see the Commission recommendation for prioritising renewables and infrastructure in permitting, while reinforcing citizens' engagement.”

On auction design, the Commission has clarified that non-price criteria should be technology-specific, pre-qualification criteria should include cyber and data security and responsible business conduct, and that other criteria such as “innovation” should be used as award criteria. It also says supply chain resilience criteria should be applied as soon as possible to strengthen Europe's clean tech manufacturing.

WindEurope CEO Giles Dickson commented: “Europe's moving away from wind auctions based solely on price. Good. Non-price award criteria reward those projects that bring the biggest value to consumers and society. And tighter pre-qualification criteria help raise the bar on what sort of turbines get built.”

Clean energy investment drives economic growth, says IEA

Booming investment in the manufacturing of clean energy technologies, especially solar PV and batteries, is becoming a powerful economic driver globally, creating new industrial and employment opportunities, according to a new report from the International Energy Agency.

In a first-of-its-kind analysis, ‘Advancing Clean Technology Manufacturing’ finds that global investment in the manufacturing of five key clean energy technologies – solar PV, wind, batteries, electrolyzers and heat pumps – rose to \$200 billion in 2023, an increase of more than 70 per cent from 2022 that accounted for around 4 per cent of global GDP growth.

Spending on solar PV manufacturing more than doubled last year, while investment in battery manufacturing

rose by around 60 per cent. As a result, solar PV module manufacturing capacity today is already in line with what is needed in 2030 based on the IEA's net zero emissions scenario. For battery cells, if announced projects are included, manufacturing capacity is 90 per cent of the way towards meeting net zero demand at the end of this decade.

The report finds that many projects in the pipeline will be operational soon. Around 40 per cent of investments in clean energy manufacturing in 2023 were in facilities that are due to come online in 2024. For batteries, this share rises to 70 per cent.

“Record output from solar PV and battery plants is propelling clean energy transitions – and the strong investment pipeline in new facilities and

factory expansions is set to add further momentum in the years ahead,” said IEA Executive Director Fatih Birol. “While greater investment is still needed for some technologies – and clean energy manufacturing could be spread more widely around the globe – the direction of travel is clear. Policy makers have a huge opportunity to design industrial strategies with clean energy transitions at their core.”

Clean energy manufacturing is still dominated by a few regions. China, for example, is currently home to more than 80 per cent of global solar PV module manufacturing capacity, said the IEA.

However, the report finds that the manufacturing of battery cells could become less geographically concentrated by the end of this decade; if

all announced projects are realised, Europe and the United States could each reach around 15 per cent of global installed capacity by 2030.

New data and analysis based on plant-level assessments of more than 750 facilities indicate that China remains the lowest-cost producer of all clean energy technologies. Battery, wind and solar PV manufacturing facilities are typically 20 per cent to 30 per cent more expensive to build in India than in China, and 70 per cent to 130 per cent more in the US and Europe.

The report – produced in response to a request from G7 leaders in 2023 – provides guidance for policy makers as they prepare industrial strategies with a strong focus on clean energy manufacturing.

G7 agrees to stop coal use by 2035

The G7 countries have agreed to stop coal use by 2035 in energy systems where emissions are not captured.

Energy and climate ministers pledged to phase out unabated coal power “during the first half of 2030s” after two days of meetings in Turin, Italy, at the end of April. Alternatively, they aim to adhere to a timeline consistent with limiting global temperature rise to 1.5°C, in line with countries' net zero pathways.

In addition to the coal phase-out, the ministers outlined a series of other initiatives aimed at promoting renewable energy, reducing emissions and enhancing energy security. These include encouraging the growth of renewables, collaborating on fusion energy research, and reducing methane emissions.

Andrew Bowie, the UK minister for nuclear and renewables, described the agreement reached at this week's G7 ministers meeting in Turin as “historic” in an interview with CNBC. “We do have an agreement to phase out coal in the first half of the 2030s,” he said.

Sources said the final agreement, however, could include leeway in the planned timeline to include the option of a date “consistent with keeping a limit of 1.5°C temperature rise [above pre-industrial levels] within reach, in line with countries' net zero pathways”. This would help countries heavily reliant on coal, such as Japan.

The global installed generating capacity of coal fired power stations grew by 2 per cent last year driven mainly by new plants in energy-hungry

China, while there was a slowing in the pace of closures of plants in the EU countries and the US.

The war in Ukraine may have caused disruptions, but these will be insignificant in the grand scheme of the energy transition, according to Ernst & Young's (EY) global energy lead.

“For most onlookers, the coal fired power phase-out in Europe appears to be progressing seamlessly. Assuming the current trend, by 2030, half of its coal fired power plants will have shut, standing briefly as hulking concrete remnants of a bygone era, before being demolished and forgotten,” it said in a statement.

Climate activists said the phase-out deal did not go fast or far enough to address the global warming effect of fossil fuel consumption. All the G7

industrialised nations apart from Japan had already committed to phasing out coal power domestically, they noted.

Countries that wished to demonstrate the ambition needed to limit warming to not more than 1.5°C, a key threshold in the 2015 Paris climate agreement, should take a tougher stance, said Jane Ellis, Head of Climate Policy at the Berlin-based Climate Analytics.

The non-governmental organisation had called for the G7 to set an earlier 2030 phase-out date for power generation by coal, and a 2035 deadline for gas fired supplies.

G7 members were responsible for more than a fifth of global emissions in 2021, it said, but none were on track to meet their 2030 emission reduction targets.

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US generation shifts from coal to renewables and gas

- Solar passes milestones amid rising installation rates
- Texas looks to more gas and interconnection to work with renewables

Janet Wood

US electricity generation is shifting from coal to renewables with supporting gas fired plants, data from the Energy Information Administration (EIA) has revealed.

In recent commentary on data reported to the US DOE, the EIA said off-peak, coal fired generation fell about 24 per cent between 2021 and 2023, due largely to natural gas fired units displacing coal fired units as an overnight source of electricity. The organisation said operators have retired about 37 GW of coal fired plant

– 17 per cent of the total – since the beginning of 2021. The coal units were displaced partly by natural gas fired generation, which rose about 22 per cent between 2021 and 2023 against a rise in electricity demand.

The lowest cost power in recent years has usually been wind, solar, and natural gas rather than coal, EIA said. As a result investment has moved towards gas fired plant and renewables, often with battery storage. The American Clean Power Association (ACP) said that power deployments were up 28 per cent on the previous year.

John Hensley, ACP's Vice President of Markets and Policy Analysis, said: "Crossing the 100 GW milestone for solar, launching groundbreaking projects like South Fork Wind, and a record-setting pace of new contracts for clean energy are clear indicators of the public's demand to bolster the grid with domestic, reliable and affordable clean energy."

Texas illustrates the shift. Grid operator ERCOT expects demand on the state's power grid could nearly double by 2030. Recently the majority of new power production has been in solar power and batteries. Solar has been

boosted further by programmes like the Biden Administration's new \$7 billion Solar for All programme. Congressman Greg Casar (D-Texas) responded to the \$400 million tranche of support in Texas by saying: "We're going to bring cheap, clean solar energy to communities across the state."

In contrast, operator ERCOT has seen slow growth in dispatchable natural gas power plants. Now a Texas Energy Fund will provide low-cost loans to build new plant, which Public Utility Commission Chairman Thomas Gleeson said was an important step to "incentivise the construction of

high-quality, dispatchable power generation for the Texas grid".

Meanwhile a plan for a new 3 GW link between Texas and the US south-east has been proposed by private developer Pattern Energy. The \$2.6 billion project, known as Southern Spirit, would triple the state's links with its neighbours, which currently total less than 1.5 GW.

"The project will provide increased electric diversification to help drive down rates for electricity customers, especially in times of high energy demand," said Hunter Armistead, Chief Executive of Pattern Energy.



The US Department of the Interior has announced two proposals for offshore wind energy auctions off the coast of Oregon and in the Gulf of Maine. The two sales proposed by the Bureau of Ocean Energy Management (BOEM) have the potential to generate more than 18 GW of offshore wind energy.

In Oregon the sale has two lease areas: the Coos Bay Wind Energy Area and the Brookings Wind Energy Area. In the Gulf of Maine Wind Energy Area, there are eight lease areas offshore of Maine, Massachusetts and New Hampshire.

"As we move forward with offshore wind energy in Oregon and the Gulf of Maine, the Bureau of Ocean Energy Management remains dedicated

to close collaboration with our government partners and key stakeholders," said BOEM Director Elizabeth Klein.

BOEM is seeking feedback on various aspects of the proposed lease areas, including size, orientation and location.

In addition to approving eight commercial-scale, offshore wind energy projects with a combined generating capacity of more than 10 GW, the Department of Interior under the Biden-Harris administration has held four offshore wind lease auctions: the New York – New Jersey region; offshore of the Carolinas; and offshore of the Pacific and Gulf of Mexico coasts.

US DOE lauds potential of AI to develop clean, resilient energy grids

Artificial intelligence (AI) could help improve the power grid in ways that boost decarbonisation, the US Department of Energy (DOE) said, although it also warned of the need to manage its carbon emissions.

A recent report says there could be potential grid improvements in four key areas that can ultimately reduce power sector emissions: planning; permitting; operations and reliability; and resilience.

"AI has the potential to significantly improve all these areas," the report concludes. AI can help make changes such as accelerating power grid models for capacity and transmission studies, using large language models to assist compliance and review with federal permitting, forecasting renewable energy production for grid operators, and using smart grid applications

to enhance resilience.

The report says using AI in related sectors such as transportation, buildings, industry, and agriculture can also help meet low emissions, security and resilience goals. It can take on tasks such as optimising planning for electric vehicle charging networks, enabling virtual power plants, generating design of structural materials for manufacturing, and discovering alternatives for critical materials.

"Employing a portfolio of these AI-enabled solutions, while mitigating any potential risks, can support transformations needed across the economy to tackle the climate crisis, reduce costs, and improve lives," DOE says.

A DOE advisory panel is expected to issue recommendations about how to meet energy demand from AI and data centre infrastructure.

Canada continues work on new nuclear as provinces take shorter-term decisions

- Clean energy projects cancelled in Alberta
- Ontario secures new capacity to meet the next decade's needs

Janet Wood

Canada's commitment to triple nuclear output by 2050 has remained steady as provinces make decisions on shorter-term energy sources.

Alberta has recently seen a scaling back of clean energy and renewables projects. TransAlta Corporation has abandoned plans to build the 300 MW Riplinger wind farm in the state and shelved three other projects, after the province adopted buffer zone rules for renewable energy developments.

The wind farm was due online in 2027 but recent regulations would call for a 35 km buffer zone around areas deemed "pristine viewscapes" and Riplinger is located near the edge of such a zone.

TransAlta also held up the 180 MW WaterCharger battery, the 100 MW Tempest wind farm and a thermal station, the 44 MW Pinnacle. In a recent trading update the company said the decision reflected market uncertainty.

CEO John Kousinioris said: "These projects all have varying degrees of merchant market exposure and have been put on hold until we receive sufficient clarity regarding the future market structure and the impact of changing frameworks on resulting market prices".

The state also recently saw cancellation of a proposed \$2.4 billion carbon capture and storage (CCS), which Edmonton-based Capital Power Corp had planned at Genesee natural gas-fired power plant. The company, which has said it wants to achieve net zero greenhouse gas emissions by 2045, said the project was technically viable but not economically feasible and it may explore CCS in future.

Alberta's electricity grid is heavily dependent on natural gas and it is exploring nuclear power in the form of small modular reactors. In January, Capital Power said it will partner with Ontario Power Generation (OPG) to assess the feasibility of developing

small modular nuclear reactors to help power Alberta's electricity grid.

OPG expects to rely heavily on nuclear power in its home state, where it estimates a future need for 18 GW of new nuclear power by 2050. In the meantime Ontario's Independent Electricity System Operator says recent contracts from ten new battery facilities totalling 1.8 GW and three natural gas and biogas generation plants will meet the province's needs until the 2030s. Energy Minister Todd Smith said new projects across the province such as three electric vehicle battery plants highlight the need to secure a steady supply of electricity.

"We have now broken records once again by completing the largest battery storage procurement in Canadian history and securing the electricity generation we need to power the next major international investment, the new homes we are building, and industries as they grow and electrify," he said.

Brazil ready to pilot offshore wind, boost output from onshore wind sites

Brazil is set to get its first offshore wind pilot project, while onshore developers are looking at co-location of wind and solar.

Petrobras is leading the offshore development. It has signed a memorandum of understanding (MOU) with the government of Rio Grande do Norte for an offshore wind farm – the first such pilot project in Brazil – expected to start operating in 2029. Previous plants for a pilot project did

not go ahead.

Rio Grande do Norte's 295 wind farms in operation produce 32 per cent of the country's wind generation. The state has 14 offshore wind areas with an estimated potential of 25.5 GW awaiting a licence.

Meanwhile, Norway's state-owned energy company Statkraft AS has announced plans to invest \$180.7 million in 275 MW of solar PV, along with batteries, to be installed at two

operating wind farms in Brazil. The wind farms are Ventos de Santa Eugenia, capacity around 519 MW, and Morro do Cruzeiro, with a capacity of 79.8 MW.

Phased construction of the solar and batteries begins in July with full operation by November 2025. Statkraft said the strategic investment "underscores Statkraft's commitment to expanding its renewable energy footprint in Brazil".

Australia says gas “essential” as renewables continue to rise

- Access to natural gas at reasonable prices will be key to achieving an 82 per cent renewables energy grid by 2030
- Federal government issues tender to add 6 GW of renewables

Syed Ali

Australia, one of the world's largest exporters of natural gas, says that it will continue to exploit this fossil fuel in the coming decades, despite having committed to achieving carbon neutrality by 2050.

In a statement last month, Resources Minister Madeleine King said: “Natural gas will remain an important source of energy beyond 2050, and its use will change as we improve industrial energy efficiency, consolidate renewables and reduce emissions.”

The government's plan aims to avoid a shortage of natural gas by promoting exploration projects to ensure that the fuel continues to be both exported and accessible to Australian families and

businesses. The document also provides incentives to increase the maritime area dedicated to carbon capture and storage projects, among other measures to ensure a transition to a green economy.

“Ensuring Australia continues to have adequate access to natural gas at reasonable prices will be key to achieving an 82 per cent renewable energy grid by 2030 and meeting our commitment to net zero emissions by 2050,” said Labour Prime Minister Anthony Albanese, who was elected after promising to combat the climate crisis.

Natural gas accounts for 27 per cent of Australia's energy generation, as well as 14 per cent of the country's exports.

Commenting on the news, Wood

Mackenzie said challenges remain in attracting investment to Australia's gas industry, including government intervention, legal challenges, and difficulties in accessing affordable capital.

Environmentalists hit out at the plan, with Australian Conservation Foundation saying on social network X (formerly Twitter): “This is a giant step towards a dark past, terrible for our climate future and one that must be abandoned.”

Nevertheless, Australia is continuing to grow renewables at pace. At the start of May the Australian federal government announced a new tender that is set to add 6 GW of new variable renewables projects, including solar and wind generation, to the country's national electricity market (NEM).

As part of the government's Capacity Investment Scheme (CIS) – a national framework aimed at encouraging investment in renewables and battery storage projects – 2.2 GW of the expected renewable energy output from the tender will be dedicated to projects in New South Wales (NSW), as part of an agreement between the federal and NSW state governments to deliver more reliable renewable energy for the state.

An allocation of 300 MW will also be dedicated to renewable energy projects delivered in South Australia.

Following the federal government's announcement, Australian Energy Market Operator (AEMO) Services announced that the next competitive tender for generation infrastructure in

NSW would be conducted as part of the national CIS. This new CIS tender will replace the NSW's scheduled Q2 2024 generation long-term energy services agreements (LTESA) tender under the NSW Roadmap. Generation projects that would have been eligible for LTESA tenders will now be eligible to participate in the CIS tender.

A single combined tender process for generation infrastructure under the CIS and NSW Roadmap is expected to be rolled out from November this year.

■ Last month Ocean Winds, a company owned equally by EDP Renováveis and France's Engie, obtained a license to develop an offshore wind power project of up to 1.3 GW in Australia.

Accelerating shift from coal to renewables can ease PLN's financial burden

Indonesia's national electricity utility, PT Perusahaan Listrik Negara (PLN), can overcome its financial struggles by accelerating solar and wind deployment while reducing coal reliance, says a recent report by the Institute for Energy Economics and Financial Analysis (IEEFA).

Indonesia has less than seven years to fulfil its Paris Agreement commitments, and PLN can play a leading role in decarbonising the country's energy sector and developing renewable

energy projects, said the IEEFA.

Over the years, PLN's financial challenges have led to substantial subsidies and compensation from the government to support operation and maintenance expenses. In 2022 alone, PLN received about Rupiah 123 trillion (\$8 billion) from the government. Subsidies and compensation for PLN have become a significant burden on the government's budget and will remain so for the foreseeable future.

“Our new report illustrates the finan-

cial case to gradually retire coal fired power plants and scale up the development of more financially sustainable renewable energy, especially solar and wind power plants,” said Mutya Yustika, the report's author and an energy finance specialist at the IEEFA. “The gradual retirement of these coal fired power plants offers benefits such as decreasing exposure to coal price volatility and reducing the significant maintenance costs.”

Having reviewed PLN's financial

statements, Yustika said that its coal purchasing cost has increased significantly since 2020. However, this did not translate to greater coal fired electricity generation, indicating potential energy production inefficiency.

As of December 2023, PLN has around 20.4 GW of coal fired power plants, 23 per cent of which have been operating for more than 20 years.

Indonesia has set an ambitious target of 23 per cent renewable energy by 2025. However, renewables only

contributed 13.1 per cent of the country's electricity mix in 2023, according to the Ministry of Energy and Mineral Resources (MEMR).

In the report, Yustika said Indonesia is set to miss its renewable energy target because of PLN's “mistaken notion” that large-scale development of renewable energy is costly, adding that technological advancements in renewables have led to more efficient energy production, lower capital and operation and maintenance costs.

Offshore wind can revitalise South Korea

The construction of offshore wind farms could introduce over 770,000 job opportunities to revitalise local communities and contribute Won 87 trillion worth of investments into South Korea's economy, says the Global Wind Energy Council.

Offshore wind is vital to meeting the country's net zero goals. But so far only 150 MW of its ambitious 14.3 GW by 2030 offshore wind targets have been delivered, with slow permitting holding offshore wind back. To realise the economic benefits set, streamlining of currently lengthy permitting processes, which typically take up to 10 years, must take place.

GWEC released two reports serving as a call to action, urging South Korean policymakers to address key concerns such as permitting and to facilitate the nation's progress in their energy transition journey.

The reports are described as “action focused” – offering guidance on how to build support for offshore wind in local communities and with the fisheries industry.

The reports showcase successful international practices and recommend the urgent passing and implementation of the Offshore Wind Power Promotion Act. This legislation is expected to streamline permitting processes to ensure the smooth roll-out of offshore wind development in South Korea.

Rebecca Williams, Global Head of Offshore Wind at GWEC, said: “Offshore wind is a good news story for South Korea. Our new report shows that 14.3 GW of offshore wind can create a huge energy and economic opportunity, revitalising coastal communities across the country, and playing a role in halting post-industrial decline.

The report, ‘How Offshore Wind Development Can Support Coastal Regeneration’ highlighted the economic benefits local cities could derive from offshore wind.

Jobs in offshore wind would be created across the value chain at different skill levels. These positions include marine engineers, factory workers, business managers.

To develop a 500 MW offshore wind farm, approximately 2.1 million direct person-days are required, in addition to various indirect or induced jobs, demonstrating the impactful economic benefits that can be brought about through the industry.

Yunsoung Kim, Professor at Energy and Space Korea, said: “Development of offshore wind farms will be a very important opportunity for regions that are at risk of declining. I hope they seize this chance to rejuvenate.”

Pakistan energy sector challenged by surge in nuclear and coal power costs

Recent data from Pakistan's Central Power Purchasing Agency (CPPA) has revealed that a substantial increase in the costs associated with nuclear and local coal power generation is presenting a significant challenge to the energy industry.

Nuclear power has seen operational costs rise significantly, by over 17 per cent in recent months. This increase has put financial strain on nuclear power producers, leading to a shift in its contribution to the national grid from the top spot in January 2024 to

second place in both February and March.

Similarly, local coal generation costs have surged, rising 33 per cent within just one month, despite being immune to external factors like exchange rate fluctuations.

■ UK company Oracle Power PLC has received a “no objection certificate” (NOC) from the Sindh Environmental Protection Agency (SEPA) in connection with its plan to build a proposed 1.3 GW hybrid renewables complex in southern Pakistan.



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Nuclear set for boost in central Europe

■ Slovakia, Czechia, Poland move forward with plans ■ UK progress interrupted by General Election

Janet Wood

Slovakia's government has recently approved plans to build another 1.2 GW nuclear reactor at Jaslovské Bohunice, where utility Slovenske Elektrarne currently operates two nuclear units. The government said its ministers of finance and economy would work out the details by the end of October.

Slovakia generates over half of its electricity at two nuclear plants. Neighbouring Czechia also relies heavily on nuclear and it recently

gained clearance from the European Commission, under EU State aid rules, for a new nuclear power plant in Dukovany.

It aims to commission a 1.2 GW plant in 2036 for trial operations, while commercial operations are planned to commence in 2038.

Elektrárna Dukovany II, a fully owned subsidiary of ČEZ Group, will be granted a state-backed power purchase contract that will ensure stable revenues for the nuclear power plant for 40 years. It will be built with a subsidised state loan to cover a majority

of the construction costs and protection against unforeseen events or policy changes.

Poland has no nuclear power plants but a longstanding plan for a plant gained impetus recently when Industry Minister Marzena Czarnecka said the country was "cautiously assuming the prospect of launching the first large-scale nuclear power plant in 2040". The timescale is longer than previous plans but the minister said it was "realistic".

The current version of the Polish nuclear programme, dating from 2020, would see two nuclear sites with a total

capacity of 6-9 GW. They would be owned by the government and Polskie Elektrownie Jadrowe as an investor and operator. The previous government selected the US Westinghouse-Bechtel consortium as a partner to build the first plant.

Elsewhere, the UK's plans to replace its ageing nuclear fleet may be interrupted by the decision by the ruling Conservative Party to call a General Election immediately, rather than waiting, as expected, until later in the year. The news could delay talks about building a new nuclear power station

at the Wylfa site. The site, which already has a closed reactor, was described by Chris Conboy, Managing Director – Nuclear & Power EMEA at AtkinsRéalis, as "one of the best locations in the UK for large-scale reactors". The government acquired the site and has been in talks with parties including South Korea's state energy monopoly, about a new plant at the site. The General Election could also delay financial agreements for a new plant at Sizewell C, for which potential investors were recently invited to submit final bids.

Higher visibility and private investment could drive change in wave and tidal outlook

Ocean Energy Europe says new revenue support measures could "drastically change the outlook" for wave and tidal energy in future.

The ocean energy sector accelerated in 2023, but the group said market visibility, which has affected the sector in the past, will improve over the next five years as 137 MW of projects will seek deployment thanks to EU funding and national revenue support. It said this had prompted several energy majors to enter the field as investors or partners, with reported private investment into the sector in 2023 up by 75 per cent.

France and the UK – two of the leading tidal markets globally – have now implemented per/kWh support for

tidal farms. But OEE called for continuation of the UK CfD ringfence and the implementation of the commercial tidal tenders announced by French President Macron to "cement the industrialisation of the sector".

Rémi Gruet, CEO of Ocean Energy Europe, said: "Revenue support at national level creates bankability for projects and market visibility for investors. It is the main driver for private investments, a message OEE has been consistently passing and which is once again reflected in facts and figures. Coupled with EU-level investment support – still needed for pilot and pre-commercial projects – it is kick-starting the industrialisation of the sector."

Denmark opens tender for up to 10 GW of offshore wind

Denmark is set to award contracts for offshore wind that could see it add 10 GW of capacity – enough to meet the country's entire electricity demand. At present Denmark has nearly 3 GW of offshore wind.

For the first time the offshore wind tender, opened recently, includes state participation: the Danish State will co-own 20 per cent of each wind farm. The auction initially aims to connect an additional 6 GW offshore wind to the grid at three sites in the North Sea, two in the Kattegat and one in the Baltic Sea. However, developers have the option to install more capacity than initially planned, potentially resulting in 10 GW or more. Excess

power produced as a result of the auction could also be used to produce renewable hydrogen and other green fuels.

Meanwhile Danish electricity transmission system operator Energinet is planning a significant expansion of its power grid. Bjarne Brendstrup, Area Manager of Energinet's Network Development, said the electricity grid is fundamental for comprehensive electrification of society.

In neighbouring Netherlands, limits in grid capacity have been a factor in delays to the country's plan to achieve 21 GW of offshore wind capacity by the end of 2031. The target date has been postponed by one year to 2032.

Storage projects boom as renewables reshape electricity supply landscape

■ UK battery pipeline up 65 per cent for the second year
■ Focus moves to co-located and long-duration storage

Janet Wood

The pipeline of battery projects in the UK has grown by two-thirds in capacity over the last year, according to a new report recently published by RenewableUK.

Its 'EnergyPulse Energy Storage' report shows that battery capacity operational, under construction, consented or being planned has increased 67.4 per cent, from 57.1 GW a year ago to 95.6 GW. The average capacity of projects being submitted for planning permission has risen from 27 MW in 2019 to 80 MW.

RenewableUK's Director of Future Electricity Systems Barnaby Wharton commented: "The appetite among investors to enter this rapidly-growing market remains enormous." But he added: "While there has been significant uptake in projects, we are a long way from delivering the 55 GW of short-term flexibility by 2035 that the government says we need in its Review of Electricity Market Arrangements."

The UK wants more storage to make

better use of power generated by abundant wind power from Scotland, which cannot be sent to demand centres further south because of grid constraints. RenewableUK argued that regulations should be updated to ease deployment of storage alongside renewables.

Senior Policy Analyst Yonna Vitanova said: "The growth of much-needed energy storage projects, co-located alongside wind and solar farms, is currently being hindered by out-dated policies and regulations which were drawn up in a different era..."

"Renewable energy developers should be able to include co-location in their business plans more easily, with a clearer rules and regulations being put in place to unleash the benefits which co-located projects can provide to the system and ultimately to consumers."

Although the UK market is the focus for a boom in battery applications, the technology is seen across Europe as key to managing renewable generation. When the German parliament

recently approved legislative measures designed to streamline administrative processes and accelerate the deployment of solar power, it included energy storage facilities in the package.

As well as easing deployment of short-term storage in the form of batteries, governments are under pressure to support long-duration energy storage, which is often higher capital cost with slower returns. Recently Iberdrola made plans to add flexibility to the Spanish system by investing in energy storage in the form of pumped-storage hydro, to which it recently allocated € 1.5 billion of its spending for 2024-2026.

The UK government's Longer Duration Energy Storage (LODES) Demonstration Programme recently provided support for a similar 'pumped storage' technology using high-density liquid instead of water, which its developer, RheEnergy, says could be used at a wider variety of sites. It recently announced a demonstrator project at Sibelco's mining operations in Devon.

EU's Hydrogen Bank prepares for second auction this year

The European Hydrogen Bank has consulted on details of a second auction for support for hydrogen production, planned for late this year, after a successful pilot auction. The consultation follows the recent announcement that the first auction resulted in seven projects across the EU winning a total of

€720 million in support.

The winning bidders will receive support for each kilogramme of hydrogen produced, sourced from the EU Emissions Trading System (Innovation Fund). The support is aimed at bridging the price gap between production costs and the price that offtakers are ready

to pay. The projects are located in Spain (three), Portugal (two), Norway (one) and Finland (one) and total 1.5 GW.

Bid prices ranged from €0.37/kg to €0.48/kg, notably lower than recent benchmarks like the UK Hydrogen Allocation Round 1, which had an average strike price of about €9.6/kg.

Jorgo Chatzimarkakis, CEO of Hydrogen Europe, said: "The competition on the market is high, but we expect the prices to rise before dropping and stabilising in the long term. The diversity in size and geographical position of the selected projects demonstrates how competitiveness and innovation

were prioritised over volume."

Around 130 projects joined the bidding to produce around 8Mt of hydrogen over 10 years, a high level of participation that led stakeholders to suggest the total support should be increased beyond the €2.2 billion earmarked by the EU Commission.

8 | International News



Egypt's 10 GW wind farm takes major step towards construction

- Jumbo onshore project valued at more than \$10 billion
- Carbon emissions will be cut by around 9 per cent

Nadia Weekes

Abu Dhabi Future Energy Company (Masdar), Infinity Power and Hassan Allam Utilities have signed a land access agreement with the Egyptian government for a 10 GW onshore wind farm in Egypt.

The project is set to be one of the world's largest onshore wind farms, with a project value exceeding \$10 billion.

The agreement gives the consortium access to a massive 3025 km² area of land located in West Suhag, where the developers will conduct the necessary

measurement campaigns, geotechnical and topographical surveys, as well as environmental studies, to progress the project.

Once under construction, the wind farm will deliver significant benefits to local communities, including job creation, community support initiatives, and the protection of the natural environment.

The wind project is expected to produce 47 790 GWh of energy per year and cut around 9 per cent of Egypt's annual carbon emissions by displacing 23.8 million tonnes of carbon dioxide per year.

Power generated from the wind farm will also help Egypt meet its strategic objective of sourcing 42 per cent of its energy from renewables by 2030 while saving the country an estimated \$5 billion in natural gas costs every year.

Masdar's CEO, Mohamed Jameel Al Ramahi, said he and his partners in the consortium supported Egypt's ambition to achieve its challenging renewable energy targets.

"At 10 GW, this landmark project is pushing the limits of innovation and scale as we work to help unlock Africa's clean energy potential, and

further advance its energy transition," he said.

Nayer Fouad, CEO of Infinity Power, said the wind farm was "a hugely important project for Egypt and the wider region".

The initial project agreement to develop the 10 GW wind farm was signed between the Consortium and the Egyptian Electricity Transmission company and witnessed by the presidents of the UAE and Egypt on the sidelines of the UN CO27 climate summit in late 2022.

Earlier in May, Egypt signed land receipt notes for another two wind

energy generation projects west of Sohag, with foreign direct investment estimated at \$9 billion.

The Chairman of the New and Renewable Energy Authority (NREA) Mohamed El-Khayat sealed the first note with the CEO of Norway's Scatec, Terje Pilskog, and the second with Orascom Construction's CEO Khaled El Degwy, on behalf of a consortium including France's Engie and Japan's Eurus Energy.

The two projects are slated to have a combined capacity of 8 GW, with 5 GW to be installed by Scatec and 3 GW by the Orascom-led consortium.

Qatar plans to increase renewable energy share to 18 per cent by 2030

The Qatar General Electricity and Water Corporation has shared details of a planned renewable energy strategy (QNRES), which commits Qatar to increase the share of renewables in its energy mix from 5 to 18 per cent.

Qatar is a leading exporter of liquefied natural gas (LNG) and relies heavily on thermal energy sources to satisfy its electricity demand.

Under the new strategy, Qatar plans to have 4 GW of large-scale renewable power generation installed by 2030.

QNRES also foresees the installation of approximately 200 MW of distributed solar generation by 2030. This is to reduce the strain on the centralised grid infrastructure and to enhance energy resilience.

QNRES targets solar energy as a primary source, given the country's high-quality solar energy resource. Qatar's global horizontal radiation level is the highest in the world, with more than 2000 kWh generated per

square metre per year.

The recommended power mix is expected to reduce Qatar's annual CO₂ emissions from the power sector by 10 per cent and carbon intensity by 27 per cent for each unit of electricity produced.

The average cost of electricity generation is estimated to fall by 15 per cent by 2030 thanks to the adoption of cost-competitive solutions, including a combination of large-scale renewable energy facilities and gas-powered high-efficiency thermal generation.

Kahramaa will issue renewable energy rules and licences, execute a detailed deployment programme and manage the tender process.

Under the planned strategy, prosumers will be able to sell surplus power to the grid at a fixed price. This is expected to result in lower electricity bills and encourage investments in solar PV.

Supply strains persist despite critical mineral price falls, says IEA

Prices for key minerals used in clean energy technologies dropped in 2023, but new IEA analysis shows the need for greater investment to support efforts to reach energy and climate goals.

The Global Critical Minerals Outlook 2024 analyses the supply and demand of important energy transition minerals such as lithium, copper, nickel, cobalt, graphite and rare earth elements.

Following two years of dramatic increases, the prices of critical minerals fell sharply in 2023. Materials used to make batteries saw particularly significant decreases, with the price

of lithium dropping by 75 per cent and the prices of cobalt, nickel and graphite falling by 30-45 per cent.

The report finds that lower prices for critical minerals in the past year, while being good news for consumers, represent a headwind for new investment, which grew by 10 per cent in 2023 – slower than in 2022.

The Outlook notes that demand for critical minerals continues to grow strongly in all IEA scenarios. Today's combined market size of key energy transition minerals is set to more than double to \$770 billion by 2040 in a pathway to net zero emissions by mid-century.

Lenders ready to support rapidly expanding energy storage projects

- 'Investor-friendly' storage projects likely to boost lender confidence
- Six-fold increase in global energy storage required to meet 2030 targets

Nadia Weekes

Lender confidence in utility-scale battery energy storage systems (BESS) is increasing, according to a new report from global energy storage company Pacific Green.

The report, 'Making project finance work for battery energy storage projects', highlights that, despite a limited number of BESS project financing deals to date, the market is reaching a turning point as projects increase in scale and lenders work with storage developers to overcome barriers to capital deployment.

Lender concerns around the small scale of projects, complexity of revenue generation models and limited technological track record are easing as early projects establish a track record of successful operation, the market better understands long-term revenue opportunities, and assets scale up from 50-100 MW to reach capacities of 250-500 MW.

Recent deals have sent a positive signal to the market that project finance is a viable option for BESS across all maturing international markets.

According to Pacific Green, the key factors that enable development teams

to successfully secure debt financing include an 'investor-friendly' project management framework covering the entire lifespan of a scheme, a robust construction plan and close management of the battery supply chain.

Battery deployment in the power sector more than doubled last year, but a six-fold increase in global energy storage is needed to enable the world to meet 2030 climate targets, according to a new report by the International Energy Agency (IEA).

In the first comprehensive analysis of the entire battery ecosystem, the IEA sets out the role that batteries can play alongside renewables as a competitive, secure and sustainable alternative to electricity generation from fossil fuels.

In less than 15 years, battery costs have fallen by more than 90 per cent, and the energy sector accounts for over 90 per cent of overall battery demand. In 2023 alone, battery deployment in the power sector more than doubled year-on-year, adding a total of 42 GW to electricity systems around the world.

In the transport sector, batteries have enabled electric car sales to surge from 3 million in 2020 to almost 14 million last year, with further strong growth expected in the coming years.

"The combination of solar PV and batteries is today competitive with new coal plants in India. And just in the next few years, it will be cheaper than new coal in China and gas fired power in the United States. Batteries are changing the game before our eyes," said IEA Executive Director Fatih Birol.

Battery deployment will need to scale up significantly between now and the end of the decade to enable the world to get on track for its energy and climate goals, according to the report. In this scenario, overall energy storage capacity increases six-fold by 2030 worldwide, with batteries accounting for 90 per cent of the increase and pumped hydropower for most of the rest.

To achieve this rapid ramp-up, costs need to come down further without compromising quality and technology. Ensuring energy security also requires greater diversity in supply chains, both for extracting and processing the critical minerals used in batteries and for manufacturing them.

While China produces most batteries today, the report shows that 40 per cent of announced plans for new battery manufacturing is in advanced economies such as the United States and the European Union.

European utilities scale back renewables targets

- Ørsted cuts 2030 targets by more than 10 GW
- “Reality check” around renewables growth

Junior Isles

Several European utilities are scaling back and reviewing targets for renewable energy, as high costs and low power prices impact their financial performance.

Last month Statkraft, Europe’s largest renewable energy producer, said it was reviewing its annual targets for new renewables capacity, while Portuguese energy company EDP is cutting back its plans, citing high interest rates and lower power prices.

The announcements came as Denmark’s Ørsted – the world’s largest offshore wind developer – has cut its renewable targets for 2030 by more

than 10 GW after it was forced to abandon two large projects in the US due to rising costs.

“There has been a big reality check around renewables growth,” said Norman Valentine, Head of Renewables Research at consultancy Wood Mackenzie. “There’s been a huge change in the cost environment.”

Although the political will to accelerate renewables growth is stronger than ever, with world leaders at the COP28 climate summit agreeing to triple capacity by 2030, several factors are affecting developers.

Rising interest rates over the past few years have pushed up the costs of financing new projects, creating

difficulties for some developers; raw material costs have also risen, while in some markets, electricity prices have fallen. The slow regulatory approvals is also an obstacle.

Birgitte Ringstad Vartdal, Chief Executive of Statkraft, which is owned by the Norwegian state, told the *Financial Times*: “We are seeing continued growth [of renewables], but at a slower pace.”

This was evidenced in November when Italian utility Enel said that it would cut its investment in renewables, from €17 billion between 2023 and 2025 to €12.1 billion between 2024 and 2026. However, the company said it planned to continue increasing

renewables capacity with partners to reach its target of 73 GW by 2026.

While some may be reducing renewables targets, investment in the grid expansion needed to accommodate renewables growth is becoming a growing focal point. In April Spanish utility Iberdrola said it would take a more selective approach to renewables and increase its focus on electricity grids.

In May, Germany’s EnBW said it will invest around €40 billion in the energy transition by 2030, noting that electricity and gas grids will be expanded along with renewable energies. Enel has also said it will invest more in upgrading its electricity networks,

while grids, while Iberdrola is planning to spend about 60 per cent of a planned €41 billion of investment on its power networks.

Meanwhile renewables continues to take an increasing share of utilities’ generating portfolio. Last month, Germany’s RWE said more than two-fifths of its electricity generation came from renewable energy during the first quarter of 2024.

“In the first three months of the year, 42 per cent of our electricity generation came from renewable sources. Currently, we have projects with a total capacity of 8.3 GW under construction,” Michael Muller, Chief Financial Officer of RWE AG, said.

Oil and gas majors face increasing climate backlash

TotalEnergies has become the latest oil and gas major to face charges of criminal wrongdoing, levelled against it by environmentalists. Last month activists launched an attempt to bring action in French courts on behalf of victims of extreme weather events.

The case names TotalEnergies’ directors, led by Chief Executive Patrick Pouyanné, and top shareholders, including BlackRock.

The accusation of criminal responsibility for the widespread fallout from extreme weather events is unique, legal academics say, and relies on a body of science that attributes such events to climate change caused by greenhouse gases from the burning of fossil fuels.

Environmental crime cases against large corporations have typically focused on specific events, such as oil spills, where the impact is able to be clearly assessed, leaving the field relatively untested.

The criminal prosecutor in Paris will now have three months to decide whether to launch an investigation into the case, the plaintiffs said, after which they will have the option of referring the case to an investigating judge.

Significant legal action by campaign

groups against polluters, including British energy company Shell, German utility RWE and Swiss cement producer Holcim, have so far involved activists pressing for financial damages or changes to companies’ business models, without alleging criminal behaviour.

The maximum penalty for involuntary manslaughter in France is five years in prison, while other accusations in the complaint, including damaging biodiversity and deliberately endangering the lives of others, can also carry prison terms.

The possibility of a sentence would be a “significant” deterrent to oil and gas companies continuing to expand production, said Donald Braman, Associate Professor at George Washington University Law School and co-author of a paper on the potential use of homicide charges in climate litigation.

“The public censure and exposure of wrongdoing that comes with a criminal prosecution is significantly more influential on shareholders, executives and companies in general than civil actions,” he said. “It’s not murder because they’re not intending to kill people, but it [climate change] is killing... more than you would

typically see in a homicide case.”

Oil and gas companies have come under increasing scrutiny, accused of showing excess profits and rowing back on climate commitments at the expense of the environment.

In mid-May Shell shareholders largely backed the oil major’s decision to weaken its climate targets. Earlier in the month it announced first quarter profits of \$7.7 billion.

“Shell continues to bank billions from flogging the fuels that are driving the crisis. With countries experiencing the worst impacts of climate change among those least responsible for it, the case for making polluters pay for the damage their industry is causing could not be clearer,” said Charlie Kronick, Senior Climate Advisor at Greenpeace UK.

He said “innovative proposals” like a ‘climate damages tax’ could unlock hundreds of billions in funding “for those at the sharp end of the climate crisis”.

The Climate Damages Tax report, published at the end of April, backed by over 100 organisations around the world, suggests that a tax on the extraction of fossil fuels could raise \$720 billion for the Loss and Damage Fund by 2030.

Wind turbine suppliers struggle despite record turbine orders

Wind turbine manufacturers are continuing to struggle, despite selling record numbers of units, as global economic and political challenges impact profits.

Vestas, the world’s number one wind turbine maker, said last month that it swung to a €75 million (\$80 million) loss in the first quarter and warned “geopolitical volatility” would continue to cause uncertainty.

Revenue fell 5.2 per cent to €2.68 billion in the first three months of the year, compared to the same period a year earlier. Its net loss compares to a net profit of €16 million in the first quarter of 2023.

However, the value of its order backlog reached a record high €61 billion.

“In 2024, continued geopolitical volatility is expected to cause uncertainty. Nonetheless, we expect a combination of higher installations and increased pricing to drive growth in revenue,” the company said in its earnings report.

It was a similar picture at German wind turbine manufacturer, Nordex. The company recorded a loss of €13.1

million in the first quarter, compared to €215 million a year ago – a reduction driven by a 29.3 per cent increase in sales in year-on-year terms to €1574.2 million in the same period.

“We have executed projects more profitably and found a stable cost environment, which means that we have significantly improved our performance compared to the previous year. After several years of high volatility and fluctuations, we now expect a more stable earnings trend and margins,” said Nordex Group CEO José Luis Blanco.

Meanwhile, Siemens Gamesa has initiated comprehensive restructuring measures and steps for long-term strategic development with the aim of achieving a double-digit operating margin. The aim of the measures is to achieve break-even by 2026 and then returning to profitable growth.

The company also announced that Jochen Eickholt will hand over the role of Chief Executive Officer to Vinod Philip on August 1, and will leave by mutual agreement on September 30, 2024.

National Grid to raise £7 billion capital to strengthen grids

UK-based network company, National Grid, plans to raise £7 billion in fresh capital to help strengthen its electricity networks in the US and UK, which are under strain due to the shift to renewable energy.

The company says it aims to raise the funds through a fully underwritten rights issue as part of a £60 billion (\$76.25 billion) investment plan over the next five years.

National Grid’s Chief Executive, John Pettigrew, said the scale of the investment was “unprecedented” and the rights issue was the “largest we’ve seen in Europe over the last 15 years excluding the banking sector”.

The transition away from centralised

baseload fossil fuel generation is expected to increase demands on electricity networks as households and businesses shift to electric cars and heating, powered by renewables.

“Over the next 10 years, the level of renewable generation is going to increase significantly, and of course economies are going to be increasingly dependent on electricity with the growth of data centres and AI, as well as the higher domestic uptake of things like electric vehicles and heat pumps,” said Pettigrew.

“These shifts are happening now, but will only accelerate as we move forward. So our plans are about investing today to support that transition.”

10 | Tenders, Bids & Contracts

Americas

Wärtsilä to supply BESS to Curaçao

Wärtsilä will supply the Caribbean island of Curaçao with a 25 MW / 25 MWh Battery Energy Storage System (BESS) to enable the expansion of renewable energy capacity. The order was placed by Aqualectra, Curaçao's government owned utilities company.

The BESS and the GEMS Digital Energy Platform will provide grid stability and reliability, reduce unserved energy and help mitigate the risk of brownouts and blackouts. The BESS system will allow Aqualectra to increase renewable generation in the power system. The BESS system will also help smooth the intermittency of renewables.

The Wärtsilä equipment is scheduled for delivery in Q1 2025, and the project is expected to be fully operational by the end of Q2 2025.

Nordex wins US wind turbine order

The Nordex Group has received an order for N149/5.X turbines from the United States and will be supplying 25 of its Delta 4000 series models. The turbines will be installed with an 89m seismic tower at an undisclosed wind farm in California. Deliveries are scheduled for the summer of 2025 with commissioning by the end of the year.

The contract also covers the service of the turbines for ten years.

GE Vernova to supply GTs Kingston Energy complex

The Tennessee Valley Authority (TVA) has ordered 16 aeroderivative LM6000VELOX package solutions, each consisting of an LM6000 gas turbine and a generator, from GE Vernova. The turbines will be installed at TVA's Kingston Energy Complex on the Clinch River arm of Watts Bar Reservoir near Kingston, Tennessee, USA. The new units will have a combined capacity of 850 MW.

The turbines are scheduled to start operation in 2028. They will have dual fuel capability to allow operation on natural gas or liquid fuels as required.

Asia-Pacific

HVDC cables for Hokuto-Imabetsu project

Sumitomo Electric Industries has received the contract for the 250 kV DC XLPE cable construction for the Hokuto-Imabetsu HVDC Link Enhancement Project in Japan being implemented by Hokkaido Electric Power Network.

The additional New Hokkaido-Honshu HVDC Link, which connects the power grids of Hokkaido and Honshu, will increase the transmission capacity of the existing New Hokkaido-Honshu HVDC Link. An additional 250 kV DC XLPE cable approximately 24 km will be installed inside the Seikan Tunnel so that the total transmission capacity of interconnection lines between Hokkaido and Honshu will be increased from 0.9 GW to 1.2 GW.

Larsen & Toubro secures 270 MW of solar orders

Larsen & Toubro (L&T) has won orders in India to build floating and ground-mounted solar parks with a combined capacity of over 270 MW. The deals were awarded to the company's Power Transmission & Distribution (PT&D) business.

L&T has been contracted by an

unnamed party to install two floating PV parks with a combined capacity of over 150 MW. The projects, the location of which was not specified, were awarded after L&T won contracts to install two floating solar parks in the state of Jharkhand.

Separately, PT&D will build a ground-mounted solar park of 120 MW. Details about the project and its owner were also unnamed.

The PT&D business has also been selected to install 765 kV transmission lines and a substation that will help interconnect solar farms in the states of Rajasthan and Karnataka.

Inox Wind wins 210 MW wind turbine order

An order to supply Hero Future Energies of India with 210 MW of wind turbines has been awarded to Inox Wind. The order is for 3 MW units, and the scope comprises equipment supply and additional services.

Inox Wind will also provide post-commissioning O&M services.

The turbines will be supplied from Q4 2025 and will be installed in South India.

Canadian Solar wins BESS projects in Japan

Canadian Solar has been awarded a contract for 193 MW of battery energy storage system (BESS) projects in Japan's first Long-Term Decarbonization Power Source Auction.

The three projects are located in Aomori, Fukushima and Yamaguchi prefectures. They will provide capacity over a period of 20 years in exchange for payments offsetting fixed storage system costs. Commercial operations are planned to begin in 2027-2028.

Canadian Solar will sign Capacity Reserve Agreements (CRA) with the Organization for Cross-regional Coordination of Transmission Operators (OCCTO).

Bids sought for renewables in Philippines

Manila Electric Co (Meralco) of the Philippines has started a competitive selection process for 500 MW of mid-merit renewable energy capacity. This forms part of Meralco's commitment to securing an increasing proportion of its supply requirements from renewable sources.

The 10-year Power Supply Agreement (PSA) for this will be for 350 MW from February 2025, increasing by 150 MW to 500 MW from February 2026.

Meralco calls for expressions of interest to be submitted by June 7. The pre-bid conference is scheduled for June 17, while the bid submission deadline is set for July 17.

Europe

European Energy to build Nalbach wind farm

European Energy has won a tender to construct a wind farm in Nalbach, Saarland, Germany. The tender was held by the municipality of Nalbach to find investors for land that the municipality owns.

European Energy is offering various participation models. All income from the land lease will be directed to the municipality.

The project is likely to involve installation of three Vestas V172 wind turbines on land owned by the municipality. Each turbine will have a capacity of 7.2 MW, resulting in a total output of 21.6 MW for the wind farm.

European Energy intends to apply for the building permit this year and

anticipates a swift approval under new accelerated processes coming into effect next year.

Siemens Energy to expand Danish network

Siemens Energy and Denmark's state-owned utility Energinet have signed a €1.4 billion framework agreement. This is for Siemens Energy to supply transformers and switchgear for Denmark's high-voltage substations to expand the country's power grid.

The focus of the agreement will be on the western part of the country, where 50 new or reinforced 150 kV high-voltage automated substations will be built and expanded over the next eight years.

Tim Holt, a member of Siemens Energy's Executive Board, said: "There is no energy transition without transmission, and that can only happen with the availability of switchgear and transformers."

Sungrow wins 230 MWh BESS order

Sungrow has signed supply and service agreements for a new BESS project with Nofar Energy. The project will be developed in Stendal, Saxony-Anhalt, Germany, and will feature the PowerTitan2.0, a liquid-cooled energy storage system.

The project will have a capacity of 116.5 MW/230 MWh.

The system will integrate a 2.5 MW power conversion system and 5 MWh battery into a single 6 m (20 ft) container.

Preferred bidder selected for Shetland 2 HVDC link

SSEN Transmission, part of electricity infrastructure company SSE, has selected Sumitomo Electric Industries and Van Oord Offshore Wind UK (the Sumitomo Electric Van Oord Consortium) as preferred bidder for the proposed Shetland 2 HVDC link subsea cable.

The subsea link, part of the National Grid's network expansion plan for Great Britain, will enable the connection of three offshore wind farm sites adjacent to Shetland and add 1.8 GW of wind generated power to the grid, equivalent to 13 per cent of the UK's commissioned offshore wind capacity.

The UK plans to develop 50 GW of offshore wind capacity by the end of the decade, up from about 14 GW at present, as it pursues its 2050 net zero target.

Hitachi Energy to build offshore wind platforms

French transmission system operator Réseau de Transport d'Electricité (RTE) and the Hitachi Energy - Chantiers de l'Atlantique consortium have signed a contract for the construction of the first offshore substations and DC converter stations for two offshore wind farms that will be built off Ile d'Oléron and Normandy (Centre Manche 1 & 2).

The 1 GW Ile d'Oléron wind farm is located off the island of Oléron, 35 km from the French coast, and the 1.5 GW Centre Manche 2 wind farm covers 260 square kilometres located 40-50 km east of the Manche department.

The two wind farms are scheduled to be operational by 2032.

Rolls-Royce to supply battery storage system

Rolls-Royce is supplying a 12 MW/24 MWh mtu battery energy storage system to Encavis of Germany.

The system will balance fluctuations in generation from German wind and solar parks. The battery energy storage system will be used in an Encavis plant in Hettstedt, Saxony-Anhalt.

Rolls-Royce will supply and install the energy storage system on a turn-key basis. It is expected to start operation in Q1 of 2025. Rolls-Royce has also been contracted to provide construction services, installation and 10 years of maintenance.

The order comprises a large-scale mtu EnergyPack QG storage system with a total of 72 battery cabinets and the intelligent mtu EnergetIQ control platform.

International

Hitachi Energy to supply Australia's Marinus Link

Hitachi Energy has been selected by Marinus Link to supply an HVDC project to augment the connection between mainland Australia and Tasmania's grid.

The 345 km HVDC system cable route will enable the flow of renewable energy in both directions between the states of Victoria and Tasmania.

The connection will enable Tasmania to import solar and wind power produced in Victoria, while reserving its hydropower for feeding the mainland grid when required. It will strengthen the security of supply in the Australian power grid.

Hitachi Energy will supply its HVDC Light voltage source converter (VSC) stations in the first stage of the project, which will convert AC to DC for long-distance transmission and DC to AC, where the electricity is returned to the grid. Upon completion of both project stages, Marinus Link will have a total capacity of 1500 MW.

Azerbaijan launches first renewables auction

Azerbaijan's Ministry of Energy, with the support of the European Bank for Reconstruction and Development (EBRD), has announced the country's first renewable energy auction for a 100 MW solar power plant project in Gobustan.

Aida Sitdikova, Head of Energy for Eurasia, Middle East and Africa in the EBRD's Sustainable Infrastructure Group, said: "Azerbaijan's decision to introduce renewables auctions is a big step towards a more diversified and sustainable energy sector."

ESS to supply energy storage to Nigeria

ESS Tech has partnered with Sapele Power of Nigeria to provide an initial 1 MW / 8 MWh of long-duration energy storage. This agreement represents the largest battery storage system export to Africa financed by the US Export-Import (EXIM) Bank.

The project will improve grid reliability and efficiency. Currently, according to the International Energy Agency, around 40 per cent of all the electricity consumed in Nigeria is produced from backup generators due to unreliable power supply caused by limited grid infrastructure, underinvestment and ineffective regulatory frameworks.

"This project will deliver improved reliability and efficiency for our generation assets in Nigeria," said Sapele Board Member Heather Onoh. "We are pleased to partner with ESS to deploy the first iron flow battery system in Africa."



Hydrogen

US DOE faces challenges moving hydrogen production forward

The US Department of Energy is continuing to pursue its hydrogen development programme through the Hydrogen and Fuel Cell Technologies Office, which has recently released its Multi-Year Program Plan (MYPP).

Gary Lakes

Getting the price of producing and using hydrogen down to a cost that industry and consumers can tolerate is a big part of making the energy transition work. The Department of Energy (DOE) has set a target price of \$1/kg by 2031 and an interim price target of \$2/kg by 2026. These targets include the cost of production, delivery and the dispensation of hydrogen for practical long-term use, but beginning as soon as possible.

The Hydrogen and Fuel Cell Technologies Office Multi-Year Program Plan (MYPP) – available on the DOE website – is aligned with the priorities of the US National Clean Hydrogen Strategy and Roadmap that was released by the Biden-Harris administration in June 2023.

The roadmap lays out a strategic framework to achieve large-scale production and utilisation of hydrogen with scenarios for 2030, 2040 and 2050, and emphasises collaboration between government agencies, industry, academia and others who hold a stake in transforming the energy industry. The roadmap lays out concrete

targets and sets market-driven metrics to measure success.

The MYPP follows a report delivered earlier this year to the DOE by the National Petroleum Council (NPC) stating that the development of hydrogen was not moving fast enough to meet the targets set by the Biden-Harris administration. While the government is providing billions of dollars in funding for the establishment of at least four hydrogen hubs across the US, shifting the country to a hydrogen economy will take some doing.

The MYPP outlines research and development priorities set by the administration. Renewable hydrogen production and storage, technology for trucking applications – a huge issue in American commerce and vital to address for energy transformation and emissions reduction – and decreasing the cost of electrolyser systems are among the challenges where action is important.

The MYPP identifies the challenges that must be overcome to realise the full potential of clean hydrogen and fuel cells and explains how HFTO's research, development, and demonstration (RD&D) activities will help to overcome those challenges in the

near-, mid-, and longer-term.

Besides reducing hydrogen production costs by 2026 and 2031, other targets include reducing the cost of the electrolyser systems to \$250/kW (low-temperature electrolysers) and \$500/kW (high-temperature electrolysers) by 2026, getting the price of dispensed hydrogen cost for heavy-duty vehicles to \$7/kg by 2028, and reduce fuel cell cost for heavy-duty transportation to \$80/kW by 2030.

Presently, hydrogen produced by electrolysis – the separation of water into hydrogen and oxygen using electricity generated by renewable energy (green hydrogen) – costs around \$5/kg, and when delivery and fuelling station costs are factored in, this could amount to around \$12/kg.

When natural gas is used in the production of hydrogen (grey hydrogen) the cost is around \$1.50/kg. Energy companies are looking to use carbon capture, utility and storage (CCUS) to produce 'clean' hydrogen, which they argue will address the requirements of transitioning to carbon-free fuels. But carbon capture has yet to be shown effective on a scale that would speed the widespread use of hydrogen. Furthermore, the carbon capture industry

requires significant investment in carbon capture infrastructure that could ultimately prove redundant.

For hydrogen to be at the place in 2050 that the administration currently envisages it, a number of challenges are going to need to be addressed – and not just cost. According to the MYPP, not only must the cost of technologies for producing, moving, storing, fuel cells and electrolysers come down, existing markets and the creation of new markets needs attention.

“Without substantial cost reductions, many of the opportunities for hydrogen will not be realised. The efficiency, durability, and reliability of hydrogen and fuel cell systems also need to be improved to achieve parity with incumbent technologies,” the MYPP report said.

De-risking and scaling up technologies across the value chain are also a part of the quest.

“To reduce investment risk, new hydrogen and fuel cell technologies need to be demonstrated and validated in real-world conditions,” the report said, adding: “And to enable scale-up of proven technologies, more-robust domestic supply chains and improvements in manufacturing (both to reduce

cost and enable scale) will be needed.”

Convincing the public that the move to hydrogen energy holds the promise of new jobs and opportunities is in itself a challenge, but the transition is one that will definitely need people to carry out. MYPP cites barriers to large-scale adoption as one of the challenges a hydrogen economy faces. Overcoming those barriers will require large-scale adoption across multiple sectors of the overall economy. And it is safe to assume that all industries will need to adapt to the new applications of hydrogen energy, which once it comes into widespread use can be expected to lead to many innovations.

A number of crosscutting areas will need improvement, the MYPP says.

These areas include safety, which will require enhanced safety practices, improved sensors, and the dissemination of knowledge. Technically sound codes and standards will need to be adopted, as well as improved and streamlined permitting processes, along with a well-trained workforce for the entire technology life cycle, from research through manufacturing to installation, repair and decommissioning.

Gas

Australian strategy relies on natural gas until 2050 and beyond

The government of Australia has recently released a policy strategy that says the country will make use of natural gas well beyond 2050, the target year for most of the world to be operating at net zero status.

Gary Lakes

Australia is one of the world's biggest producers of natural gas and other natural resources. Its gas exports are among the largest in the world and it supplies major Asian consumers. In recent years the gas industry in Australia has been through a debate with the government over domestic supply obligations and prices for the local market. The new strategy looks to provide security for the economy and keep the industry strong, yet continue to take steps to comply with global carbon emissions reductions.

The Future Gas Strategy (FGS) will support the continued exploration for natural gas in Australia along with increased production. According to the strategy drawn up by the government of Prime Minister Anthony Albanese, Australia will maintain a gas policy based on Australia's "commitment to

being a reliable trading partner," the FGS states.

This means that the gas industry will continue to produce and export enough gas to fulfill its LNG contracts with big importers like China, Japan and Korea for as long as those markets want LNG.

Natural gas exports in the form of LNG provides Australia with some 14 per cent of its export revenue. Gas also covers 27 per cent of the country's domestic energy consumption.

The strategy outlines a pathway for natural gas to support the transition to a sustainable and low-emission energy future while ensuring energy security and affordability for the country.

The Albanese government said the policy will support domestic supply and assist with the transition to net zero. For their part, environmentalists in Australia argue that gas is not a transition fuel, but a key contributor to global warming. Furthermore, they

argue that the new strategy will open new gas basins that will do more damage to the country's land, water and communities.

Australia's gas industry has been at odds with the government over steps to regulate it – mostly in reference to measures designed to assure a safe and affordable supply to domestic customers, and policies designed to restrict carbon emissions. But while the government has made efforts to move the country towards a net zero future, the gas industry continues without great encumbrances.

At the launch of the FGS, Minister for Resources Madeline King said decisions on gas supply and production will be based on the best possible information.

“The strategy makes it clear that gas will remain an important source of energy through to 2050 and beyond, and its uses will change as we improve industrial energy efficiency, firm

renewables, and reduce emissions,” King said.

“But it is clear we will need continued exploration, investment and development in the sector to support the path to net zero for Australia and for our export partners, and to avoid a shortfall in gas supplies,” the minister said, adding: “The strategy makes it clear that we can't rely on past investments to get us through the next decades, as existing fields deplete. That will mean a continued commitment to exploration, and an openness to the kinds of foreign investment that have helped build the industry into the powerhouse it is today.”

Implementing the FGS will not be easy for Australia, and it faces a number of challenges. Emissions reduction will require balancing production and consumption while minimising the release of greenhouse gases. Large investments will be needed to upgrade the infrastructure for cleaner gas

production and distribution. Securing the money needed for such investments in a timely manner will be crucial. Failure to get the timing right as the energy shift gathers momentum could risk Australia's efforts to transition to cleaner and cheaper energy. Meeting the goals for carbon reductions must be done in a way that does not disrupt energy supply or make energy unaffordable.

On top of it all, the government will have to keep everyone happy during the process, perhaps the biggest challenge of all. The industry can expect to react to measures that they will see as disruptive to their process or incurring new costs or as trade obstacles. The public will have their set of environmental concerns, may oppose changes in their long-held pattern of doing things, worry over the impact that certain measures may have on public health, and what it will cost them as taxpayers.

Key considerations for the development of floating wind farms

With the ability to be installed further offshore in water depths beyond the limits of fixed-bottom structures, floating wind farms are emerging as the next generation of renewable energy sources. Fugro's **Brian Bell** says there are seven key considerations for developers looking to build projects.



Bell: The key to successful deployment lies in addressing the unique challenges of floating structures

Development of wind farms in deeper waters – where winds are stronger and more consistent – will go a long way to meeting the targets governments around the world have set for clean energy generation. Floating wind farms can significantly contribute to the global effort of transitioning away from fossil fuels and help limit global average temperature rises to below 2°C, a key goal of the Paris Agreement.

The floating wind sector is still in relative infancy compared to fixed-bottom, with engineering solutions and supply chains still being developed. The remote location of floating sites, as well as the harsh offshore weather conditions they need to endure, provide challenges for both development as well as operations and maintenance. Thankfully, advances in technology, investment and a growing desire to succeed are already helping to make significant gains.

When developing an offshore wind farm, there are seven key things that can mitigate potential challenges.

■ *Use technology to balance stability, complexity and cost.* Engineers are actively exploring various floating designs, each accompanied by a dedicated mooring system. These moorings ensure stability for the floating platforms, alongside tailored anchor solutions which are essential to optimise holding capacity in the light of the specific ground conditions and expected load patterns at the installation site.

Floating foundations occupy a significantly larger surface area than their fixed-bottom counterparts. Consequently, acquiring comprehensive geo-data becomes more demanding. To compare the feasibility of multiple floater and anchor combinations, developers must gather extensive geophysical and geotechnical datasets to obtain a clear understanding of seabed conditions. Depending upon the scale and resolution of data needed for engineering design, survey scopes can become significantly larger compared to monopile wind farms.

Advancements in data interpretation can help to refine data need and enable design choices. Ground modelling is rapidly becoming a mainstream component of layout design, and techniques such as seismic inversion allow engineers to predict soil properties without location specific geotechnical data. It must be highlighted that site specific data is still needed to verify assumptions and mitigate ground risk, but by integrating data acquisition and interpretation methods, we can harness new technologies while maintaining flexibility in evaluating anchoring options and patterns.

■ *Enhance floating wind farm foundations with strategic soil sampling.* To realise the sector's aspirations and demand for floating wind capacity, it is estimated that approximately 3400 floating platforms and 10 000 anchors will be deployed annually during the 2030s. Achieving this scale necessitates swift and precise engineering methods that can adapt to diverse soil conditions.

Anchors face unique hurdles, such as cyclical forces, intricate load dynamics, and the trenching impact of mooring lines. These factors must be factored into anchor designs to preserve holding capacity throughout the operational life of a floating wind farm.

A thorough understanding of the soil context for each anchor is essential, achievable through methodical laboratory testing of high-quality representative soil samples. Strategic investments in soil sample collection and analysis can help favourably influence the levelised cost of energy (LCOE) for floating wind farm projects, allowing developers to understand seabed conditions and design components without expensive over engineering.

The collection and analysis of high-calibre soil samples is pivotal for the development of floating wind farms. Optimising anchor designs is not only about meeting installation demands but also about ensuring enduring holding capacity, all while reducing cost and risk.

■ *Undertake a proactive geo-hazard assessment.* Floating wind sites are subject to a different spectrum of geo-hazards to their fixed-bottom counterparts, necessitating more intricate site characterisation. Early comprehension of geological conditions and potential geo-hazards is vital to mitigate risks, ensuring the planned development and enduring performance of the wind farm.

The initial step in geo-hazard identification is a comprehensive desktop study, leveraging dependable data to evaluate a broad array of factors. The insights from a desktop study can then inform the extent of site investigation campaigns needed, allowing project objectives and deadlines to be achieved in line with development expenditure budget.

Techniques for *in-situ* geo-data collection for geo-hazard assessments share commonalities with routine site investigations, including CPTs and boreholes. Dispatched samples undergo examination at specialised core logging facilities to trace the sediment's history and composition.

Specialists model geological events to evaluate the relevance and frequency of risks in relation to the offshore wind farm's lifespan. The

findings from these assessments inform and enhance the design of wind farm structures.

■ *Unlock the power of partnerships.* The operational success of Hywind Tampen, currently the largest floating wind farm with 11 turbines and an 88 MW capacity, sets the stage for even more ambitious projects beyond 2030. While standardisation of parts and designs, as well as supply chain up-scaling will play a significant role, innovation remains a key driver for expanding capacity and achieving scale.

Future floating wind farms, projected to be as much as 20 times larger, will demand even greater cost efficiency – and innovation, as well as collaborative efforts and shared objectives, will be pivotal in making this a realistic prospect. Opportunities abound, including academic studies, joint industry initiatives, sponsorships, and technology trials alongside established benchmarks.

Clients, counterparts, and colleagues all play a vital role in igniting and accelerating innovation. Collaborating early with advisors fosters exploration and propels the exciting future of floating wind energy.

■ *Use flexible data acquisition that can adapt and operate in deep waters.* Over 20 countries are venturing into commissioning floating offshore wind farms, and while most sites will be located in waters 60-250 m deep, some proposed sites are already approaching 1500 m. A thorough early analysis of site conditions is therefore essential for designing reliable and cost-effective floating assets that will perform as expected for decades.

As the industry evolves to embrace floating wind, iterative data processes and multi-disciplinary expertise will be required to create detailed ground models. Where possible, we should be incorporating models and data from existing offshore infrastructure to optimise site characterisation – but building data acquisition methods that can operate in deep waters will be essential.

■ *Design operations and maintenance requirements from the outset.* For floating wind projects to pose a serious viable alternative to fixed locations, the long-term operations and maintenance requirements must be considered and factored into projects from the very outset.

It is estimated that the cost of operating and maintaining floating wind farms could be three to five times more than traditional fixed-bottom sites. This is influenced by the fact that operators must contend with more turbulent and unpredictable conditions further out at sea – meaning structures will be continually shifting, turbines may need to be

towed back into port for maintenance, additional technology and training will be needed to ensure worker safety, and delays caused by weather are more likely.

■ *Implement remote monitoring to reduce costs.* Developers will need assurance that the benefits of floating wind will not be overshadowed by high operations and maintenance costs, and leveraging techniques such as remote monitoring will go a long way towards reducing operational costs. When wind turbines are further offshore, remote monitoring will help asset managers to receive early warning of any concerns, and minimising costly in-person site visits in the process. With this technology, an operator could detect problems such as instability, fatigue or corrosion, by remotely monitoring turbines using a set of specialised sensors permanently installed onto assets – reducing the need for personnel to travel to the site so often. Likewise, rapid growth in remote and autonomous inspection capabilities now allow vessels and vehicles to inspect sites – both above and below the waterline – whilst operators and observers remain onshore. This could be critical in reducing exposure hours, improving safety and increasing operational uptime.

For developers currently planning floating sites, whatever their design, now is the moment to think about how they can leverage automated and digitalised data delivery to provide early warnings of wear or failure, and improve asset performance.

The development of floating wind farms represents a significant advancement in renewable energy technology, offering a promising solution to harness offshore wind power in deep waters.

The key to successful deployment lies in addressing the unique challenges of floating structures, such as stability, geo-spatial data acquisition, and anchor design. Strategic soil characterisation, proactive geo-hazard assessments, and innovative partnerships are crucial for optimising design and ensuring the longevity of these assets. As the industry moves to larger and more complex floating wind farms, flexible data acquisition and remote monitoring will play vital roles in reducing operational costs and enhancing performance.

By addressing these seven considerations from the outset, developers can pave the way for floating wind farms to become a viable and sustainable alternative to traditional fixed-bottom wind farms, contributing significantly to the global effort to combat climate change.

Brian Bell is Global Director of Offshore Wind at Fugro.

Accelerating the clean energy revolution begins with distribution

Distribution is often missing in the energy transition discussion, resulting in a disconnect between the politically agreed pace of the transition and the incremental investment growth of distribution grids. Eurelectric's **Kristian Ruby** says it is vital that we close this gap swiftly and effectively. Its 'Grids for Speed' report serves as a roadmap to guide policymakers, industry players and investors towards a fair and swift transition to clean energy.

When we talk about the energy transition, the distribution grid is often the forgotten giant of the conversation. The political discussion often gravitates towards generation technologies. And when grids are mentioned, it's often transmission. Yet, as the intertwined mega shifts of the green transition – decarbonisation, decentralisation and digitalisation – unfold, it's time we give distribution grids the spotlight they deserve. Eurelectric's new study 'Grids for Speed (GfS)' study seeks to do just that.

Europe's grids were originally planned for a heavily centralised fossil-fuel based energy system where the electricity flow was a one-way street from power plant to customer. Today this picture is more complex.

The power system is decarbonising at record speed. Renewable capacity should make up 42.5 per cent of final energy use by 2030 and the share of direct electrification is expected to double from now until 2040. In the coming years, about 70 per cent of new renewable generation and electricity storage will be connected at distribution level with renewable capacity growing nearly six-fold between 2020 and 2050. This represents a massive increase in variability on the distribution grid.

In parallel, growing electrification of heating, transport and industry translates in a much higher electricity demand than before, both in terms of growing capacity and new connections. Electric vehicle (EV) chargers alone will require more than 15 000 new connections a day.

Adding to this technically challenging transformation, comes an alarming increase in cyber threats and extreme weather events. The numbers in our study speak volumes: a six-fold rise in cyber-attacks and a staggering 13-fold increase in damage from extreme weather events. These numbers underscore the urgency of the situation.

Today there is a disconnect between the politically agreed pace of the energy transition and the incremental investment growth of distribution grids. It's vital that we close this gap swiftly and effectively.

As shown in our study, an annual

investment of €67 billion is necessary from 2025 and 2050 across EU countries and Norway. This financial commitment is pivotal to realising the ambitious vision of the EU Green Deal as well as our energy security needs.

Despite the high price tag, this investment cost pales in comparison to the cost of fossil fuel imports reaching €451 billion in 2023. Moreover, this commitment equates to a mere 0.4 per cent of the EU27 GDP or a modest €150 per capita annually.

While the investment challenge is serious, several emerging grid strategies could lower costs by up to 18 per cent – to €55 billion per year – if properly implemented. Among them, anticipatory investments reign supreme. Planning and investing ahead in a strategic way will allow grid operators to not only tackle the challenges of today's grid constraints, but also to shorten connection queues and reduce curtailment of renewable production. Enabling this anticipatory framework is possible only if national regulators get on board, allowing grid operators to invest in a forward-looking manner with adequate remuneration schemes.

Other strategies revolve around asset performance excellence and grid-friendly flexibility mechanisms. This means leveraging technologies that monitor grid assets' health, as well as strategically renewing and replacing components to maximise performance. Grid-friendly flexibility can also help defer the need for reinforcement by optimising network management efficiency and reducing grid congestions when demand reaches its peak.

These strategies can only be enabled by a digitalised system. Digitalising the entire grid environment would improve efficiency, raise grid capacity and partially defer the need for grid reinforcement. Our new study 'Wired for Tomorrow' shows that digitalisation can significantly improve efficiency when building, operating and maintaining the electricity grid, and that the role of regulation is once again key to guide investments where they are most needed.

Neglecting this investment need



Ruby says the distribution grid is often "the forgotten giant"

carries significant consequences. Delaying grid enhancement not only hampers the speed of the energy transition, but also imperils energy security and the societal benefits of decarbonisation.

Without action, 74 per cent of key decarbonisation technologies will not materialise – resulting in missed connections for 190 million heat pumps, 120 million EV chargers, 1220 GW of distributed renewables, and 240 TWh of industrial electrification – our 'Grids for Speed' study confirms. Worse yet, inaction could lead to an additional 1800 – 2060 Mt CO₂e emissions by 2050 – meaning missing net zero by 37 per cent.

So how do we get the grid up to speed? In 'Grids for Speed', we highlight three key actions: planning and investing in a strategic way, establishing a robust regulatory framework and streamlining supply chain integration for scalability.

Today, our regulatory framework falls short of a much-needed forward-looking change of mindset. As 15 European countries gear up to reassess remuneration frameworks by 2026, the current regulation should be urgently reformed. This includes dismantling national blockers and empowering distribution system operators (DSOs) to invest in anticipated capacity needs, simplifying processes to enable quick decisions and providing additional financial support, in the form of non-tariff funding instruments, that provide an attractive risk-reward profile while keeping high standards of regulatory oversight.

Achieving net zero also hinges on scalable supply chains for grids. Even with sufficient investment, unresolved bottlenecks in the supply chain can jeopardise timely deployment. By 2050, doubling transformers from 4.5 to 9 million and increasing conductors from 10 to 16.8 million km will be imperative. Yet, a copper shortage could become a bottleneck for getting our grids up to speed. To

succeed, immediate action is vital across material sourcing, manufacturing, procurement, and permitting.

Aligning our infrastructure and supply chains with our vision on grids for speed is a race against time. It is also closely tied to having a skilled workforce capable of translating investment into tangible infrastructure. To tackle these hurdles head-on, we have to supercharge supply chain efficiency. From enhancing material supplies to streamlining permitting, to creating training initiatives and education certificates, each step is pivotal. But none of this progress will be possible without effective collaboration among industry, European policymakers and national regulators.

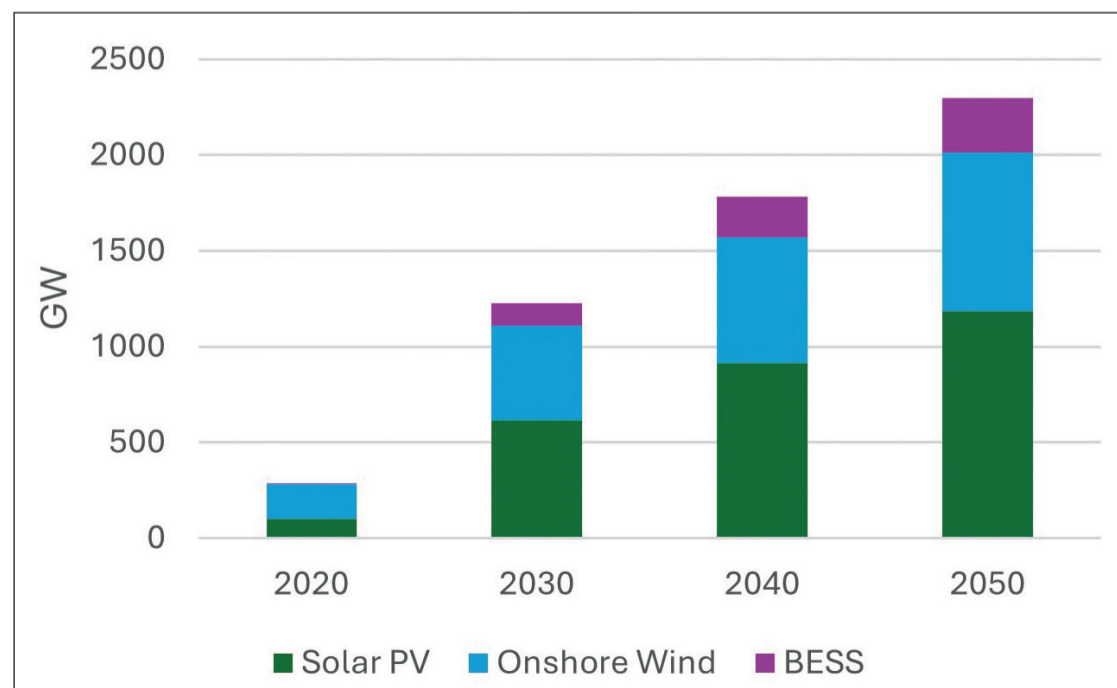
If we succeed, society stands to undergo a transformative shift. Enhanced grid speed promises amplified benefits, including a resilient electricity supply, new green jobs, a decarbonised system and lower energy bills in the long-term. Distribution prices are expected to remain stable until 2050, despite increased consumption, as the rate of electrification will enable investments to be spread across more customers and amortisation of assets will be spread across decades.

Delivering on the EU's net zero and REPowerEU targets demands a harmonious convergence of regulations, collaboration, investment, talent and supply chain optimisation. 'Grids for Speed' serves as a roadmap for policymakers, industry players and investors, to guide them towards a fair and swift transition to clean energy. By embracing the investment needs and fast-tracking regulatory strategies outlined in our report, we are confident in the potential to turn a clean and renewable future from possibility into reality.

Let's not languish any longer: the time to act is now.

Kristian Ruby is Secretary General at Eurelectric.

Renewable energy capacity in the EU



VPPs, AI, and EVs: a boost to the EU energy transition

Virtual Power Plants (VPPs) will be a key technology for the energy transition in the EU in the coming years, and the rapid growth of electric vehicles will aid the development of VPPs through technologies such as Vehicle-to-Grid (V2G) digital solutions. This offers operators and investors a great number of investment opportunities, writes **Joseph Jacobelli**.

The EU will be adding tens of gigawatts of solar and wind capacity annually through 2030. This will strain Transmission System Operators (TSOs). The expansion will bring the renewable energy capacity to about 1070-1200 GW by 2030, up from just under 400 GW in 2022. The EU aims for renewables to account for at least 42.5 per cent of final energy consumption by 2030, up from less than 23 per cent in 2022. The tripling of solar power and doubling of wind energy in such a short period will further stress the already stretched grid infrastructure in several EU countries. Eleven of 26 grids are not sufficiently accounting for renewables targets in their plans, according to independent energy think-tank Ember. The EU estimates that over €580 billion (\$630 billion) will be invested in grid improvements, with a large portion dedicated to digital solutions.

Virtual Power Plants (VPPs) are a digital solution that can assist TSOs. These systems combine three elements: distributed energy resources like solar panels, batteries in EVs, and others, utilising software-based technologies to manage and dispatch this combined energy effectively. They rely on information and communication technologies together with the Internet of Things. By leveraging VPPs, TSOs can achieve a more efficient power grid, balancing the integration of intermittent renewables and stabilising the overall grid for better reliability. Additional advantages include providing a continuous power supply, being available quickly or even immediately, remote controllability, affordability, and cost savings for end users.

VPPs can connect millions of energy assets across various locations, allowing them to work together. Increased computing power leads to more efficient coordination, enabling assets ranging from home air conditioning

systems to large industrial machines to operate in unison. VPPs can handle billions of data points in near-real time, including weather data, consumer information, electricity market data, and other sources. All this information feeds into the VPP system, which constantly measures the overall power system, forecasts energy demand, and assesses available supply. According to Origin Energy, an Australian utility, AI makes this whole process faster and more efficient.

For VPPs to be effective, recording consumer energy consumption data through smart meters is essential. The EU is making progress but needs to accelerate its push to add smart meters, as current adoption is below ideal levels. The EU27+3 (Norway, Switzerland, UK) should see a penetration rate of almost 80 per cent by 2028, equal to 326 million meters, compared to just 56 per cent at the end of 2022, notes Berg Insights, a consultancy. The cost to install smart meters averages €180-200 (\$195 – \$217) per meter while saving €270 (\$293) per metering point in billing and achieving an average energy saving of 2-10 per cent, according to a study by the EU Directorate-General for Energy in March 2020. It is worth noting that smart meter installation is a rolling process, as their life cycle is between 10 and 20 years.

The interaction between VPPs, EVs, and AI offers significant long-term potential for operators and investors. The quality of batteries for EVs is rapidly improving, providing users with longer ranges for the same number of kilowatt-hours used. Additionally, the cost of batteries for EVs, as well as for other forms of storage, has been progressively falling and many forecast it will continue to decline.

Currently, electricity for EVs is unidirectional, flowing from the grid to the vehicle via a charging point. In

recent years, an increasing number of companies around the world have been developing bi-directional or vehicle-to-grid (V2G) technologies. This allows EVs to act as small, on-site power plants, sending unused battery power back to the electricity grid when needed, becoming a key component of VPPs. This helps balance the power grid and ensures a steady supply of energy, especially when renewables are present in the system. AI-led technological breakthroughs will optimise the input and output of EV batteries and ensure their life cycle is not overly impacted. This is known as Vehicle Grid Integration (VGI).

In the past few years, many V2G start-ups have been established. Over 140 were identified as V2G solutions providers to watch in 2023 by StarUs Insights, a database focused on start-ups and technologies. In Portugal, Pocityf, was set up in 2019, focusing on energy management and smart urban mobility, aiming to integrate V2G with solar power. In the US, EnergyHub, a distributed energy management systems and software provider, partnered with Toyota, a major Japanese auto manufacturer, to provide V2G services to Toyota and Lexus cars initially in Maryland. In the UK, renewable energy supplier Octopus Energy launched a V2G tariff for customers in February 2024. It offers EV owners free charging if they sell the power stored in their vehicles back to Octopus Energy during peak hours. The company plans to expand this offering to other markets, including France, Japan, and New Zealand.

EV ownership has grown exponentially in the EU during the past few years and is expected to continue posting strong growth. The European Environment Agency provided detailed figures from 2010 through 2022. The number of battery EVs and

plug-in EVs rose to almost two million from less than 600 during this period. Battery EVs alone increased to 1.13 million. The share of electric car registrations was 21.6 per cent, including 12.2 per cent for battery EVs, in 2022. Just five years earlier, in 2018, it was less than 2 per cent in total, including just 1 per cent for battery EVs. Preliminary estimates indicate that in 2023, battery EVs reached a 15 per cent market share.

There are already a large number of companies developing VPPs, and more are likely to join the sector. The German electric utility company Next Kraftwerke GmbH is present in six EU countries and is regarded as one of the major operators of large-scale VPPs. It had a networked capacity of about 13.5 GW as at the end of 2023. It involves almost 17 000 small producers, and energy storage facilities, as well as commercial and industrial consumers.

Another of the many participants in the VPP market is the German energy producer Sonnen GmbH, owned by Shell since 2019. The home energy storage systems for private households and small businesses (over 125 000 thousand batteries installed), operates in 11 countries across three continents, Asia, Europe, and North America. In Europe, Sonen's VPP capacity is 250 MWh, which it hopes to grow to 1000 MWh.

A third example is Enel X, the energy supply and management services arm of Italian utility Enel with 65 million customers and 90 GW in installed capacity. It has been highly active in the VPP space all over the world. For example, it won a contract with the Australian Energy Market Operator to supply 120 MW of flexible demand capacity in October 2023. Of note a number of European energy technologies manufacturers are also involved in VPP sector, they include ABB, Bosch, Schneider Electric, and Siemens.

The growth trend of VPPs in the EU and beyond is expected to accelerate sharply over the next few years. Several research firms project the market to expand from less than \$2 billion to between \$10 and \$24 billion, with a compound annual growth rate exceeding 20 per cent. Spherical Insights & Consulting estimates the global VPP market will grow to \$13.7 billion by 2032 from \$1.8 billion. Inkwood Research provides a more conservative estimate of \$9.5 billion, while Fortune Business Insights forecasts a substantial increase to \$24 billion.

Joseph Jacobelli heads family office Bougie Impact Capital. He has over 30 years' experience in energy markets as an investor, executive, and analyst. He promotes climate finance awareness through publication and on the "Asia Climate Finance Podcast." Note: This commentary is based on a section of Joseph's forthcoming book "Empowering Clean Energy's Succession: How Policy and Finance Are Changing Business for the Climate"

Year	Battery electric cars	Plug-in electric cars	Electric vehicles total	Growth Year Over Year (%)	Total cars	Share of battery electric cars (%)	Share of all electric cars (%)
2010	591		591		11,128,785	0.01	0.01
2011	7,179		7,179	1,114.7	10,498,868	0.07	0.07
2012	13,730	6,225	19,955	178.0	9,369,664	0.15	0.21
2013	21,454	31,079	52,533	163.3	9,573,937	0.22	0.55
2014	31,197	60,370	91,567	74.3	10,075,476	0.31	0.91
2015	46,857	84,115	130,972	43.0	11,150,601	0.42	1.17
2016	54,065	65,011	119,076	(9.1)	12,027,051	0.45	0.99
2017	83,491	88,334	171,825	44.3	12,574,590	0.66	1.37
2018	132,377	106,502	238,879	39.0	12,753,440	1.04	1.87
2019	242,966	137,632	380,598	59.3	12,991,283	1.87	2.93
2020	536,186	525,311	1,061,497	178.9	9,924,123	5.40	10.70
2021	878,092	862,569	1,740,661	64.0	9,694,858	9.06	17.95
2022	1,126,682	873,042	1,999,724	14.9	9,252,358	12.18	21.61

New registrations of electric cars, EU-27

Notes: columns 3,4 and 6 calculated by the author, column 7 recalculated by the author.

Source: European Environment Agency, 24 October 2023 <https://www.eea.europa.eu/en/analysis/indicators/new-registrations-of-electric-vehicles?activeAccordion=309c5ef9-de09-4759-bc02-802370dfa366>.



Drawing a line in the sand

A “new era” in battery storage is being hailed with the development of a sand battery system designed to boost the profitability of wind and solar. *TEI Times* explains.

Late last year, Finnish start-up company Polar Night Energy (PNE) teamed up with Ilmatar, a Nordic energy company and independent power producer (IPP), to start what is being dubbed as a “new era” in clean energy production. Their collaboration focuses on addressing critical challenges in wind and solar power generation, with the goal of enhancing profitability and grid stability.

In December 2023 PNE embarked on a two-year programme to develop and commercialise the electricity production capabilities of a novel sand battery that converts excess renewable energy into heat, then back into electricity.

Ilmatar, one of the leading IPPs in the Nordics, will participate in the development and will be among the first to be offered the state-of-the-art large-scale power-to-heat-to-power (P2H2P) systems. Ilmatar will provide PNE with commercial piloting opportunities on their wind farms when the technology reaches an advanced stage. This will mark a significant step toward the practical deployment of this innovative solution.

“The renewable energy production business has finally reached the volume level where we can focus more on the cost-efficient, large-scale and flexible energy storage,” said Ilmatar’s New Business Development Manager Katja Koponen.

A well-known challenge of weather-dependent energy production is that electricity market prices are often low when production is at its peak. By developing new high-capacity energy storage solutions, the two companies say they are building a flexible and decentralised energy system of the future while also creating new business opportunities and addressing bottlenecks in electricity transmission.

“Installing energy storage behind the meter at a wind farm makes

controlling electricity output to the national grid easier. Similar advancements will follow with solar power as its grid presence grows. These large-scale storage solutions are crucial in our long-term strategy for cleaner energy,” said Markku Ylönen, CTO of Polar Night Energy. “Ilmatar’s exclusive focus on wind and solar, without any history of combustion-based production, aligns with our vision.”

PNE was founded in 2018 but the roots of the company’s sand battery go back further. The company’s founders Tommi Eronen and Markku Ylönen met while studying at Tampere University of Technology in Finland and had their first discussions on the technology in 2013.

After plenty of Comsol Multiphysics models and first technology validation at Kuhmalampi, Kangasala, in 2017 they decided to focus on solid material thermal energy storage and PNE was born a year later.

Commenting on their motivation, Ylönen said: “We are trying to mitigate climate change as it is one of the biggest challenges of our time. To mitigate climate change, we need solutions for storing energy generated from weather-dependent renewable sources such as solar and wind. Also, the trend of declining electricity prices, increasing volatility, and the need for energy storage all played a part in starting the company.”

He added: “It was clear that increasing renewable energy production won’t be enough to decarbonise the heating sector without high-capacity storage.”

PNE’s patented high-temperature large-scale heat storage technology is at the heart of its system. It uses sand, or sand-like material, as the storage medium, which leads to safe operation and a natural balance in the storage cycle. Additionally, sand is a cheap and abundant material, which can be heated up to 1000°C and even higher.

Inside the sand is a heat transfer system that enables effective energy transportation to and from the storage. Proper insulation between the storage and environment ensures long storing period, from hours to months, with minimal heat losses.

PNE says its battery enables the upscaling of solar or wind energy up to 100 per cent of a facility’s heating and electricity demand. The size and usage of the heat storage affects its efficiency but the shorter the storage period, the less heat is lost between charging and discharging.

Resistive heating of sand is essentially 100 per cent efficient, but the efficiency is lowered by heat loss through the boundaries of the system. However, there are several ways PNE tackles this problem.

Ville Kivioja, PNE’s Lead Scientist, explained: “Since sand is a solid material heat is transferred inside the

storage only by conduction. As the heat conductivity of sand is low, the outer parts of the storage act effectively as insulators for the core and thus there is always a considerably steep radial temperature profile inside the storage.

“Simply put, unlike for water-based storage systems that have constant temperature everywhere, the outer layers of a sand-based heat storage have temperatures much below the average temperature of the system and the heat does not flow effectively from core to the outer layers and finally to the ambient space.”

Although sand has self-insulating properties, PNE uses conventional insulation at the boundaries of the system. A heat transfer pipe system inside the sand allows the boundaries to be prioritised when discharging the storage and prioritises the core when charging.

“This means that even if some of the heat is about to be conducted to the outer layers, we can make use of a good proportion of it instead of it getting lost. For the heat charged to the core of the system, it takes a very long time to reach the boundaries,” said Kivioja.

The size of the storage therefore affects the efficiency, since a smaller system has more surface area compared to its volume than a bigger one, and the heat loss is essentially proportional to the surface area.

“Simply put, the core of the storage can hold the heat for a very long time without it getting lost, and the core is bigger for bigger storage,” said Kivioja. PNE’s models show that large 1 GWh systems will have an efficiency of 95 per cent.

The systems are designed based on simulations using COMSOL Multiphysics software, using 3-D transient heat transport models with real-life input and output data.

The desired storage period completely depends on the application and the needs of the customer, and can vary from one day to several months.

PNE says the physical size of its storage systems can range from tens to thousands of cubic metres. It is possible to locate the storage underground, therefore requiring minimal space, which is crucial at, for example, construction sites.

PNE is currently focusing on two products. At the moment it can offer a heat storage system with 2 MW heating power with a capacity of 300 MWh or 10 MW heating power with a capacity of 1000 MWh. However, the heat storage system is scalable for many different purposes and there are plans to expand the product range in the future.

Compared to other forms of storage, PNE says the design of the sand battery is simple, robust, and customisable, leading to high efficiency

and low cost per unit of energy capacity. This, it says, makes it suitable for a number of potential applications since 36 per cent of all industrial process heat is in the temperature range of 60-400 °C. This is the current range of PNE’s thermal energy storage. Relevant industry sectors include food and beverage, chemicals, paper and pulp, textiles, and space and district heating.

The first commercial sand-based thermal energy storage was for Vatajankoski, an energy utility based in Western Finland. This system provides heat for Vatajankoski’s district heating network in Kankaanpää, Finland. The sand battery has 100 kW heating power and 8 MWh capacity. Full-scale utilisation of the storage commenced in 2022.

A larger 1 MW sand battery in Pori will be fully operational next spring. This is a significant step in scaling up the sand battery technology, as it will also act as a primary production plant for Loviisan Lämpö’s district heating network.

PNE also has a 3 MWh running test pilot in Hiedanranta, Tampere, which is connected to a local district heating grid to provide heat for a couple of buildings. The pilot enables testing, validation and optimisation of the heat storage solution. Here, electricity is partly supplied by a 100 m² solar panel array with the rest coming from the grid.

In the latest collaboration, PNE and Ilmatar are committed to exploring the most effective methods for integrating PNE’s sand battery into Ilmatar’s wind and solar installations in order to drive the transformation of the renewable energy landscape.

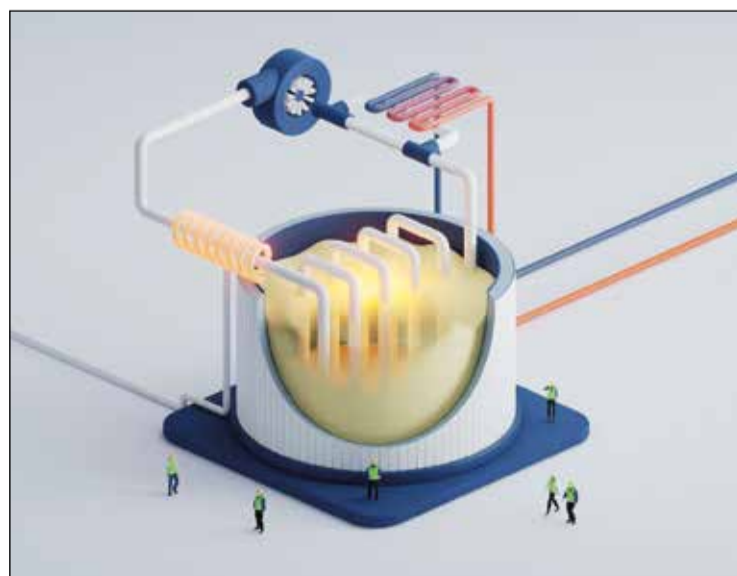
Since the sand battery will be charged using electricity, charging during hours where cheap and clean electricity is available is crucial. PNE has therefore developed algorithms that optimise the charging pattern. Using these algorithms, the thermal energy storage can effectively utilise the cheapest hours of the electricity markets or any excess renewable energy production.

For Ilmatar, a sand battery could potentially deliver extra profit by allowing it to access the ancillary service markets, whose purpose is to balance the electric grid. Moreover, it can offer valuable flexibility to the electricity network.

The collaboration is a major milestone for development of the technology and the company. Ylönen concluded: “After a successful seed round, we are now growing our sales and R&D teams to better cater to our customers’ needs and advancing our capabilities in converting stored heat back to electricity.”

“We are in a very good position to realise our vision of decarbonising energy production and establishing Polar Night Energy as the leading global provider of large-scale thermal energy storage solutions.”

Polar Night Energy’s sand battery is a large-scale high temperature thermal energy storage that uses sand or sand-like materials to store energy in sand as heat. Illustrations by Simo Heikkinen.
<https://www.simoheikkinen.fi>





Junior Isles

Staying on the grid

The city of Athens – the venue for this year’s Eurelectric Power Summit – was a splendid backdrop to discuss the key challenges facing Europe’s power sector and the implementation strategies that are urgently needed.

With European elections about to take place shortly and Hungary set to take over the rotating presidency of the Council of the European Union from July, it was perfect timing for Atilla Steiner, Hungary’s State Secretary for Energy and Climate Policy within the Ministry for Energy, to set out what he sees as the main areas for action.

Steiner first noted that Hungary was taking over the presidency at a very important time. “It will be the last institutional cycle before 2030,” he said. “And we will have the privilege of

setting the tone for the next institutional cycle.”

Steiner shared his thoughts on the priorities he would like to put on the agenda during what will be Hungary’s second presidency semester. During its first presidency, back in 2011, the motto was “stronger Europe”. Since then, the continent has endured several crises – from financial and immigration crises to war between Russia and Ukraine, and a crippling energy crisis.

According to Steiner, Hungary would like to “provide a platform” for all stakeholders to forge a much deeper collaboration in difficult times. For the energy sector he said a key goal will be to reduce the gap between policy and implementation.

“We have many ambitious goals and good strategies but we are lagging

behind on the implementation. The key is how we can move everybody to implement our strategic directions. One of the key priorities of the Hungarian presidency will be the competitiveness of Europe... we’ve talked a lot about sustainability and 2040/2050 targets but I think the competitiveness of Europe now and in the coming years has been a little bit forgotten.

“Energy is one of the key pillars of competitiveness... Europe is a resource-poor continent, without much fossil fuel, but we do have renewables. But we need more debate on how we master it, so I think the Energy Council sessions will play a crucial role in the next semester when we talk about competitiveness.”

The plan, he says, is to organise an informal Energy Council session in July and a formal session in December, with “several conferences” in between on energy topics.

Three main priorities are on the table for energy. The first will be much more focus on implementation and how it “can be translated into EU language”.

“Theoretically National energy and climate plans will have been finalised and submitted to the European Commission by the start of the Hungarian presidency, said Steiner. “So we will have an overview of where we are standing. Is there still a significant gap to reach 2030 [targets]? What actions do we need to meet our goals? Is it feasible to meet those goals? That debate is still missing.”

It was clear from a recently launched Eurelectric study that there is a need to significantly accelerate the pace of the energy transition, which in large part can be achieved through electrification. Steiner noted that in Hungary, electrification “has the largest potential” to drive the transition by replacing gas with another energy carrier, namely electricity.

According to Eurelectric’s ‘Grids for Speed (GfS)’ report, in order to deliver on plans to go green, electricity demand, which “has only seen modest growth in the last three decades”, needs to rapidly accelerate. Its figures show electricity as a percentage of final energy demand must grow from 20 per cent in 2015 to 60 per cent in 2050.

Such a change, however, depends on building grids that are up to the task of underpinning a more electrified society. According to the GfS report, failure to invest in distribution grid modernisation in particular will stall much-needed connections of technologies, such as renewables, heat pumps and electric vehicles (EVs). For example, EVs in the EU will grow from 8 million today to 69 million by 2030, says Eurelectric. Meanwhile distributed renewable capacity will grow six-fold from 2020 to 2050, with about 70 per cent of future renewables and storage being connected to the distribution grid.

The report, produced with the support of EY, is informed by data from distribution system operators (DSOs) serving more than 60 per cent of European energy users. It also includes National Energy and Climate Plans (NECPs), network development plans (NDP) and proprietary EY data. The report is modelled by EY and Imperial College London (ICL) through to 2050, using ICL’s representative grid modelling methodology.

Introducing the report at the summit, Eurelectric’s Secretary General Kristian Ruby said: “We need to double

investment in distribution grids compared to the last four years.” The numbers show that €67 billion investment annually is needed to 2050, up from €36 billion per year in 2023, to deliver a distribution grid that will enable the energy transition.

That money will be used to reinforce grids to handle increasing demand; renew ageing grids; install smart meters and to make grids smarter through automation and digitalisation.

It seems like a tall order, but as Ruby said: “€67 billion. These figures seem daunting but we should not panic; after all they are a sum of what 27 countries need to do together. And it’s not a crazy amount when compared to the €451 billion paid for fossil fuel imports, or other sector investments [such as road and rail].

“And another bit of good news is, the €67 billion can be reduced if we do things right.” Eurelectric calculations show this can be slashed by 18 per cent to €55 billion by “doubling down” on cooperation between regulators, authorities and companies to invest today in the long term future of Europe.

Ruby also noted that the promise of new technologies such as smart transformers, grid flexibility solutions, dynamic line rating, digital twins, etc., will also contribute to getting costs down.

“We have refrained from quantifying the amount we can save from these technologies because what we want to do is work with you [the industry] as a community to identify those technologies that can help bring down the bill further,” said Ruby.

In another collaborative report with Accenture called ‘Wired for tomorrow’, Eurelectric offered six key insights on DSO digitalisation – one being balancing build-out and flexibility.

Dr Sabine Erlinghagen, CEO Siemens Grid Software, Siemens Smart Infrastructure, pointed to the importance of flexibility management in this respect. “... It’s all about taking action on flexibility management,” she said. Speaking on the sidelines of the conference, she added: “You could bring down the €67 billion cost if you made the grid smarter. If, for example, flexibility management was used, you could avoid some of the capital investment and build-out because the grids are used in a smarter way.”

Dr Erlinghagen noted that the low-voltage grid is the least managed part of the grid. “It’s like a blind spot in the grid. Not only do you need to shed light on that blind spot, i.e., understand and know what’s happening in the low-voltage grid, understand how loaded your assets are and plan accordingly. And then you need to act on it. Because we are talking about millions of devices and the very distributed nature of the LV grid, it’s a task that is humanly impossible to do.”

At the Summit, the company launched its latest Gridscale X offering, LV Management. With additional insights and transparency over what is happening on the low-voltage grid, operators can use the software as a ‘co-pilot’, helping them to deal with the increasing complexity and challenges related to low voltage grids.

In many ways it is like help with connecting the dots. Certainly there are numerous points to link if the EU is to navigate the disconnects that are currently hampering its energy transition. Doing it in a smart way is not only cheaper but is essential.

