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Clean energy will cover all new electricity demand over next three years

The IEA's Fatih Birol says "these are very promising trends"

Clean energy sources are continuing to expand at record pace and will cover all new electricity demand in the next three years, according to the International Energy Agency. But faster uptake of all low-carbon sources is still required to meet climate targets. **Junior Isles**

All additional electricity demand in the next three years is forecast to be covered by low-carbon technologies, according to a new report from the International Energy Agency (IEA).

Its 'Electricity 2024' report, the latest edition of the Paris-based agency's annual analysis of electricity market developments and policies, finds that while global growth in electricity demand eased slightly to 2.2 per cent in 2023 due to falling consumption in advanced economies, it is projected to accelerate to an average of 3.4 per cent from 2024 through 2026.

Record-setting electricity generation from low-emissions sources – comprising renewables, such as solar, wind and hydro, as well as nuclear power – are expected to account for almost half of the world's electricity generation by 2026, up from a share of just under 40 per cent in 2023.

Notably, renewables are set to make up more than one-third of total electricity generation by early 2025, overtaking coal.

Launching the report, its lead author, IEA Electricity Analyst Eren Çam, said: "This is the first time that fossil fuel generation falls below 60 per cent since [the start of] IEA records dating back five decades. This is an important milestone that we expect to see over the next three years."

The report finds that the increase in electricity generation from renewables and nuclear appears to be pushing the power sector's emissions into structural decline. Global emissions from electricity generation are expected to decrease by 2.4 per cent in 2024, followed by smaller declines of around 0.5 per cent in 2025 and 2026.

The report notes that China is set to account for about half of the decline in global power sector emissions over the next three years. The US will account for one quarter of the global decrease followed by the EU, which will account for about 20 per cent of the fall in emissions. Power sector emissions in places such as India and Southeast Asia, however, continue to climb, although these increases are not sufficient to offset the overall global decline.

"The power sector currently produces more CO_2 emissions than any other in the world economy, so it's encouraging that the rapid growth of renewables and a steady expansion of nuclear power are together on course to match all the increase in global electricity demand over the next three years," said IEA Executive Director Fatih Birol. "This is largely thanks to the huge momentum behind renewables, with ever cheaper solar leading the way, and support from the important comeback of nuclear power, whose generation is set to reach a historic high by 2025. While more progress is needed, and fast, these are very promising trends."

The report also finds that electricity prices were generally lower in 2023 than in 2022. However, price trends varied widely among regions, affecting their economic competitiveness. Wholesale electricity prices in Europe declined by more than 50 per cent on average in 2023 after having reached

Continued on Page 2

Renewable energy has 'real chance' of achieving COP28 goal, says IEA

The world's capacity to generate renewable electricity is expanding faster than at any time in the last three decades, giving it a real chance of achieving the goal of tripling global capacity by 2030 that governments set at the COP28 climate change conference in December, the International Energy Agency (IEA) says in a new report.

Published in January, 'Renewables 2023', the latest edition of the IEA's annual market report on the sector, says the amount of renewable energy capacity added to energy systems around the world grew by 50 per cent in 2023, reaching almost 510 GW. Solar PV accounted for three-quarters of additions worldwide.

The largest growth took place in China, which commissioned as much solar PV in 2023 as the entire world did in 2022, while China's wind power additions rose by 66 per cent year-on-year. The increases in renewable energy capacity in Europe, the United States and Brazil also hit all-time highs.

The latest analysis is the first comprehensive assessment of global renewable energy deployment trends since the conclusion of the COP28 conference in Dubai in December. The report shows that under existing policies and market conditions, global renewable power capacity is now expected to grow to 7300 GW over the 2023-28 period covered by the forecast. Solar PV and wind account for 95 per cent of the expansion, with renewables overtaking coal to become the largest source of global electricity generation by early 2025. But despite the unprecedented growth over the past 12 months, the world needs to go further to triple capacity by 2030, which countries agreed to do at COP28.

"The new IEA report shows that under current policies and market conditions, global renewable capacity is already on course to increase by two-and-a-half times by 2030. It's not enough yet to reach the COP28 goal of tripling renewables, but we're moving closer – and governments have the tools needed to close the gap," said IEA Executive Director Fatih Birol.

Although world leaders at COP28 failed to agree on a phase-out of fossil fuels, it was the first time they had reached a deal to transition away from fossil fuels.

■ COP28 saw the creation of a global alliance of electricity companies called Utilities for Net Zero Alliance (UNEZA). The main goal of this partnership is to achieve a net zero future by 2030 and to promote grids for renewable energy and clean energy deployment. UNEZA is made up of 30 partners, including EDP, Iberdrola, Enel, Engie and RWE, in addition to the International Renewable Energy Agency (IRENA).

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record highs in 2022 following Russia's invasion of Ukraine. Yet electricity prices in Europe last year were still more than double pre-Covid levels, while prices in the US were about 15 per cent higher than in 2019. Electricity demand in the European Union declined for the second consecutive year in 2023, and it is not expected to return to levels seen before the global energy crisis until 2026 at the earliest.

In another report published at the end of November, Capgemini said that although renewable electricity capacity additions are driving the shift in electricity supply, the current growth is far below what is needed and must triple to meet 2050 targets.

A key observation from the 25th edition of its annual 'World Energy Markets Observatory (WEMO)', created in partnership with Vaasa ETT and Enerdata, is that renewable capacity needs to triple. While $1.3 trillion of energy transition investments in 2022 was a record

Lewiner says acceleration of clean technologies will be "critical"

(significantly outpacing spending on fossil fuels), it needs to accelerate to $5 trillion per annum to align with a net zero emissions pathway.

In 2022, renewables capacity additions set a record with an annual addition of 340 GW and 2023 should be another record year. However, this growth is far below what is needed to achieve net zero carbon in 2050 as global renewable capacity should grow by 2400 GW over the 2022-2027 period (i.e. an annual average growth of 480 GW). Solar photovoltaic (PV) broke a record for annual capacity additions in 2022 and looked set for another record year in 2023. Wind additions decreased by 19 per cent globally, with offshore wind development encountering difficulties in Europe and the US.

Electricity consumption will have to quadruple by 2050 to hit decarbonisation objectives, with over 75 per cent of it supplied by wind and solar. Linked to this growing electrification is the need to expand electrical grids that will have to become smarter with more stationary storage, sensors, and intelligent exploitation of large masses of data.

Colette Lewiner, Energy and Utilities Senior Advisor at Capgemini, said: "Despite progress, the world is not on the right climate trajectory. Even though investments in renewable energy in 2022 reached an unprecedented high, an acceleration of clean technologies will be critical... What is needed to make sure the five big green energy technologies – wind, solar, nuclear, batteries and hydrogen – can meet their 2050 targets is by no means a small effort. The main obstacles are linked to financing and to the difficulty of adapting our economy quickly."

Power sector "very close" to peak emissions

Global use of coal for power generation will start to decline by as early as this year, which will in turn lead to a sustained fall in global emissions in the sector.

Junior Isles

Analysis by Ember has revealed that the world is close to a turning point where power sector emissions stop increasing and start declining.

The UK-based energy and climate think-tank says the world is "getting very close" to a turning point where the rapid growth of wind and solar pushes the world into a new era of falling fossil generation.

According to analysis by Ember, 107 of 215 economies passed peak fossil generation at least five years ago, setting the stage for a global peak and subsequent decline in power sector emissions.

Despite hopes for a decline in fossil fuel emissions in the power sector this year, adverse hydro conditions prevented emissions from falling in the first half of 2023, according to Ember's mid-year analysis.

Global power sector emissions plateaued in the first half of 2023 as wind and solar continued to grow. Power sector emissions would have fallen by 2.9 per cent had global hydro generation been at the same level as last year.

"In our 'Global Electricity Review 2023', we showed that in 2022 the growth in wind and solar generation (+557 TWh) met 80 per cent of global electricity demand growth (+694 TWh). This has already helped to significantly slow the growth in power emissions: without wind and solar power, fossil fuel generation would have been 20 per cent higher than it was in 2022.

"We forecasted that with average growth in electricity demand and clean power, 2023 would see a small fall in fossil generation (-47 TWh, -0.3 per cent), with bigger falls in subsequent years as wind and solar grow further. That would have meant 2022 being the year of peak emissions. However, issues with hydro are now making that look unlikely."

In a separate report, independent energy research and business intelligence company, Rystad Energy, said global coal fired power generation was expected to peak in 2023. It said coal's decline will begin in 2024 as solar and wind grow in popularity. New electricity supply from renewables will outstrip power demand growth, leading to coal's displacement.

Europe and North America are systematically replacing coal generation with cleaner sources like natural gas and renewables, reducing coal power capacity by more than 200 GW since 1990. Europe's decline is mainly driven by strict emissions policies, while North America has primarily replaced coal generation with gas power as abundant regional production has slashed prices.

Meanwhile, a recent report called for an "urgent" end to subsidies for the most polluting energy sources both by the EU's 27 member states – highlighting gaps between the bloc's own policies and its push to phase out fossil fuels.

An independent adviser to the EU recently said it must double annual emissions cuts and move fast to pass existing green plans into law if it is to meet its climate targets. In January the report by the European Scientific Advisory Board on Climate Change called on the bloc to implement previously announced plans to support clean technologies and the development of critical minerals, as well as reforms to energy taxation.

Eyeing European parliamentary elections in June, Ottmar Edenhofer, a leading German climate economist who chairs the European Scientific Advisory Board on Climate Change, warned: "We cannot afford to lean back now." The EU "needs to provide long-term policy signals based on long-term plans for the net zero transition", the report said.

Politicians will meet for the last time in April ahead of elections, when right-wing parties that want to slow the pace of progress are expected to focus on rhetoric about the social costs of switching away from fossil fuels to combat climate change.

EU agrees provisional deal to reform electricity market

The European Union's bid to reduce dependence on fossil fuels and stabilise consumer prices, took a big step forward in December as EU leaders reached a provisional agreement to reform the bloc's electricity market.

A vote to rubber stamp the deal is expected within the next two months, just before Parliament adjourns to start campaigning for the European election in June.

The EU's plans are aimed at making the market less vulnerable to volatility and were seen as a response to Russia's invasion of Ukraine, which helped send energy prices spiralling for consumers and businesses last year.

The EU Council said in a statement: "The reform aims to make electricity prices less dependent on volatile fossil fuel prices, shield consumers from price spikes, accelerate the deployment of renewable energies and improve consumer protection."

The Electricity Market Design aims to enhance the roll-out of renewables and increase the amount of energy traded in long-term contracts to make the price less dependent on fossil fuel prices and variations on the wholesale market.

The reform streamlines Power Purchase Agreements (PPAs) and introduces two-way Contracts-for-Difference (CFDs) for wind, solar, geothermal, hydropower without reservoir and nuclear energy. For the latter, Member States have flexibility in terms of redistributing revenues from CFDs – with the provisions for CFDs only kicking in after a transition period of three years (after entry into force of this legislation).

Daniel Fraile, Chief Policy Officer at Hydrogen Europe, highlighted the significance of the agreement. "This reform takes us one step closer to a net zero system. The inclusion of flexibility targets and the promotion of non-fossil flexibility support schemes in the new market design are the right strategic choice to accelerate the decarbonisation of the energy system," he said.

Teresa Ribera, the Energy Minister for Spain, which currently holds the presidency of the Council of the EU, said: "This deal is great news, as it will help us reduce even more the EU's dependence on Russian gas and boost fossil-free energy to cut greenhouse gas emissions."

In January, a Wood Mackenzie report forecasted flat global gas demand for the coming year. The market sentiment for gas and liquefied natural gas (LNG) will remain bearish into 2024 with European prices having fallen by 45 per cent to $10 per million British thermal units (mmbtu) in the past three months it said. The report 'Global Gas and LNG: 5 things to look out for in 2024' states that high storage levels coupled with a mild Northern Hemisphere winter will see global prices remain relatively weak this year amid subdued global demand.

"[Wood Mackenzie] has been forecasting lower 2024 prices for much of last year, especially compared to forward curves, amid weak market fundamental expectations" said Massimo Di Odoardo Vice President of Gas Research at Wood Mackenzie. "Global LNG supply growth will remain limited at 14 million tonnes (Mt), but with Asian LNG demand still weak, competition for LNG is unlikely to heat up."

Hard-to-abate industries need $13.5 trillion to fast-track decarbonisation

Global funding and stronger policy incentives are needed to scale clean power, clean hydrogen and carbon capture around industrial clusters, according to the 'World Economic Forum Net-Zero Industry Tracker 2023'.

The report calculates that transitioning to a more sustainable and carbon-neutral future will require $13.5 trillion in investments by 2050, particularly in the production, energy and transport sectors.

According to the report, the investment figure is derived from average clean power generation costs of solar, off-shore and on-shore wind, nuclear and geothermal, electrolyser costs for clean hydrogen and carbon transport, as well as storage costs.

The Net-Zero Industry Tracker 2023, published in collaboration with Accenture, takes stock of progress towards net zero emissions for eight industries – steel, cement, aluminium, ammonia, excluding other chemicals, oil and gas, aviation, shipping and trucking – which depend on fossil fuels for 90 per cent of their energy demand and pose some of the most technological and capital-intensive decarbonisation challenges.

While the pathway to net zero in these sectors will differ based on unique sectoral and regional factors, investments in clean power, clean hydrogen and infrastructure for carbon capture, utilisation and storage (CCUS) will be needed to accelerate industrial decarbonisation across most sectors.

"Decarbonising these industrial and transport sectors, which emit 40 per cent of global greenhouse gas emissions today, is essential to achieving net zero, especially as demand for industrial products and transport services will continue to be strong," said Roberto Bocca, Head of Centre for Energy and Materials, World Economic Forum. "Significant infrastructure investments are required, complemented by policies and stronger incentives so industries can switch to low-emission technologies while ensuring access to affordable and reliable resources critical for economic growth."

US interest grows in HVDC connectors

- Onshore link to connect New Mexico and Arizona over 500 miles
- Barriers assessed to deploy thousands of miles of links offshore

Janet Wood

Financing has been completed for a wind power and transmission line project that will see a high voltage direct current (HVDC) line built in southwestern USA. The project comes as a joint industry project (JIP) is launched to investigate the use of HVDC technology offshore.

Pattern Energy announced it had a deal on $11 billion financing that encompasses an array of financial instruments, including an integrated construction loan, letter of credit facility, term facilities, tax equity term loan facility and a holding company loan facility.

Its finalisation launched the construction of SunZia Transmission and SunZia Wind. SunZia Transmission is a 3 GW, 525 kV, 550 mile HVDC line, linking central New Mexico to south-central Arizona. It will transport power generated by Pattern Energy's 3.5 GW SunZia Wind facility, which stretches across Torrance, Lincoln, and San Miguel Counties in New Mexico.

Hunter Armistead, CEO of Pattern Energy, said: "Our success in securing financing for the largest clean energy infrastructure project in American history sets a precedent for other ambitious renewable initiatives crucial to hastening our transition to a carbon-free future."

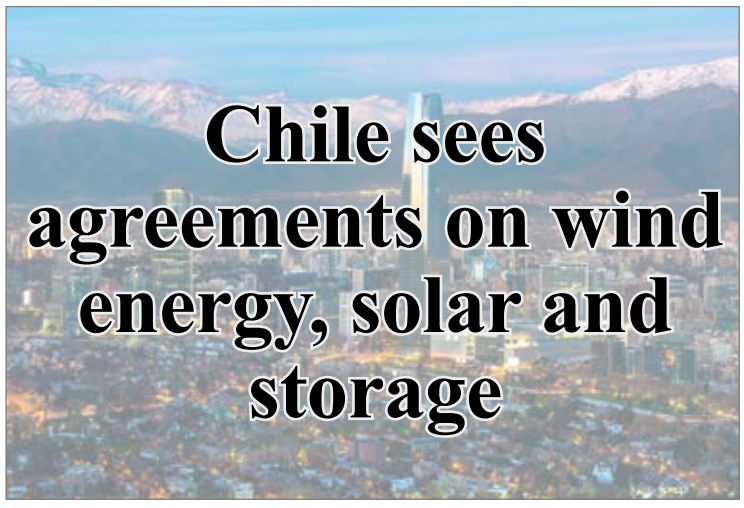
The project comes as consultant and assurance provider DNV launched a JIP with ten offshore wind and transmission developers to identify changes to electrical standards and standardisation needed to enable the connection of HVDC transmission into the US electricity grid.

The ten participants are Atlantic Shores Offshore Wind, EDF Renewables, Equinor, Invenergy, National Grid Ventures, Ocean Winds, PPL TransLink WindGrid, RWE, Shell and TotalEnergies.

In early 2024, Phase one of the project will be an inventory of key technical issues that stand in the way of the use of HVDC transmission and prioritisation. DNV and the JIP participants will use the findings to raise awareness of the barriers to the greater use of HVDC transmission and the stakeholder bodies who can help overcome them. Through this effort DNV and the JIP participants hope to reduce project risks, accelerate deployment timelines, and ensure that supply chain constraints are considered.

DNV's recently published Energy Transition North America report found that the USA will not achieve its clean energy goals without modernising its power grid and forecast that more than 5900 miles of HVDC undersea transmission cables are needed by mid-century.

"To put it simply, there will be no transition without transmission," said Richard S. Barnes, Region President, Energy Systems North America at DNV. "It doesn't matter how much clean power generation capacity is online if there is no low-cost, reliable way to get that energy to the grid."



Chile sees agreements on wind energy, solar and storage

Chile is expanding development of its extensive renewable energy resources. Solar power specialist Andes Solar has announced a commercial agreement with Portugal's EDP Renovaveis to co-develop three wind energy projects with a combined capacity of over 450 MW. The companies plan to build the wind farms in the Chilean regions of Nuble and Los Rios. The projects are at different stages of development and are expected to be in operation in between 2027 and 2030.

For Andes Solar, the alliance boosts its development portfolio to more than 2 GW across Chile, while EDP Renovaveis will expand its presence to new regions, after arriving in the country in 2021.

Meanwhile, Chile's huge Oasis de Atacama project advanced when Spanish renewables company Grenergy Renovables signed an agreement with China's BYD Co Ltd to procure 1.1 GWh of batteries.

With a planned 4.1 GWh of batteries and 1 GW of solar, Grenergy believes Oasis de Atacama is the world's largest storage project. The first phase is slated for operation in 2024, and the second in 2025, Grenergy said.

"The agreement with a leading company like BYD demonstrates our firm commitment to energy storage and represents a major step forward in securing the supply needed to be able to develop and build the battery projects we have recently announced," said Grenergy CEO David Ruiz de Andres.

Vineyard Wind exports its first power to the grid

Copenhagen Infrastructure Partners and Avangrid have exported power from Vineyard Wind to the New England grid for the first time. The project expects to have five turbines operating at full capacity early in 2024.

"For the first time we have power flowing to the American consumers from a commercial-scale wind project, which marks the dawn of a new era for American renewables and the green transition," said Tim Evans, Partner at CIP, and Head of North America.

Avangrid CEO Pedro Azagra said: "We've arrived at a watershed moment for climate action in the US, and a dawn for the American offshore wind industry."

The project will consist of 62 wind turbines generating 806 MW. It began offshore construction in late 2022, achieved steel-in-the-water in June, and saw the country's first offshore substation completed in July.

Meanwhile, regulators in Louisiana have approved operating agreements allowing Vestas Wind Systems of Denmark and Japan's Mitsubishi to develop offshore wind projects in state waters. The decision greenlights different property agreements with Mitsubishi's Diamond Offshore Wind and Vestas's Cajun Wind. "One agreement offers more on the front-end, while the other pays more over time. These being the first wind energy operating agreements for the state, we were breaking new trails in negotiating," said Tom Harris, Louisiana Department of Natural Resources (DNR) secretary.

Energy flows set to be reshaped in Argentina, Brazil and Chile

- Renewables set to lead power sector investments
- Gas flows to change as Argentina invests and Bolivia declines

Janet Wood

Solar power will be the fastest expanding technology over the coming decade in Argentina, Brazil and Chile, according to new analysis from Wood Mackenzie, because of falling costs and the rapid advances in batteries.

Wood Mackenzie's 'Southern Cone Investment Horizon Outlook' says that, driven by advances in batteries and lower costs, solar will outpace wind growth rates. The total solar market, comprising both distributed generation and utility-scale projects, is set to grow by 48 GW, the report said, while wind will add 31 GW of onshore projects through 2033.

Total investment in new power generation will bring the total to around 400 GW in the three countries by 2033 and renewables will take the lion's share of investments in new power supply, representing 81 per cent of total capital expenditure. It highlighted expansion in the non-regulated market, and said in that context Brazil stands out: it is due to add 46 GW of non-regulated capacity in the upcoming decade.

"Challenges to boost demand and develop transmission capacity will be the main obstacles to further power market growth," said Marina Azevedo, Senior Power Analyst for Wood Mackenzie.

Grid congestion issues are being addressed in different ways.

In Argentina, the government incentivises the private sector to invest in new lines and infrastructure reinforcement for guaranteed priority dispatch for its power plants.

Brazil is increasing the frequency of transmission auctions, and a boom in infrastructure investments that will come online by 2030 has already been announced.

Finally, in addition to transmission, Chile is advancing in regulation to spur battery storage in an attempt to find faster solutions to deal with high levels of curtailments that are creating economic hurdles for renewable projects.

The report said that investment in gas for power generation will decrease in the region. Instead natural gas will be used to increase industrial activity, especially in Brazil and Bolivia.

Gas production will decline in Bolivia, while Argentina will account for 72 per cent of the forecast investment in the gas market. Production in Brazil will also increase.

The evolution in gas markets will reshape the regional dynamics in the next ten years, said Eduardo Seraphim, gas research analyst for Wood Mackenzie. He explained: "The region will evolve from the current state of Bolivia balancing Brazil and Argentina, and Argentina exporting seasonally to Chile, to a state in 2033 where Argentina and Chile will be integrated, Bolivia will be producing only for its internal market and Brazil will be supplied by domestic production and by firm LNG offtake."

Canada looks at low-carbon generation and carbon removal

Carbon removals and new nuclear are both under investigation in Canada. Deep Sky, a carbon removal project developer, and Airhive, a UK-based direct air capture (DAC) startup, have partnered to deploy carbon removal technology in Quebec, where Airhive will deliver and install a modular DAC unit for Deep Sky's pilot facility in 2024.

Airhive's technology combines a fluidisation process that makes static solid particles behave as if fluid with carbon-absorbing rock minerals reformed into small particles with very high surface areas.

Damien Steel, Deep Sky's CEO, said: "We're advancing the carbon removal industry, one DAC unit at a time," while Rory Brown, Airhive CEO, said: "At 1000 tonnes annual capacity, our system will be one of the largest installed end-to-end DAC systems in the world."

Deep Sky's facilities are located in Quebec, a region with an abundance of hydroelectric power and wind power potential, as well as the geological makeup required for carbon capture.

In Alberta, in contrast, power companies are following Ontario in looking at small modular nuclear reactors (SMRs). Capital Power Corp. and Ontario Power Generation (OPG) have agreed to jointly undertake a two-year feasibility study to assess their use.

OPG is already developing an SMR at its Darlington site in Ontario. Edmonton-based Capital Power has about 7.7 GW generating capacity at 30 facilities across North America.

Japan supports India's clean energy journey

- JICA to support power sector decarbonsiation roadmap
- India has "unique opportunity" to become low-carbon economic powerhouse

Syed Ali

India's plans to tackle climate change received a boost last month, as the Japan International Cooperation Agency (JICA) said it would work with the world's third highest polluter on a roadmap to cut carbon emissions.

In January, Saito Mitsunori, the chief representative of the agency's India Office said a decarbonisation roadmap for the power sector "will be formulated by the government with JICA's support in the coming years".

JICA is also working with the Central Electricity Authority to help it with planning policy formulation and terms of the power sector development, apart from funding renewable sector development, he added.

India has an ambitious goal of decarbonising energy to 50 per cent and achieving 500 GW of fossil fuel-free generating capacity by 2030. This would require the country to meet 50 per cent of its electricity requirements from renewable energy sources by 2030.

In its recent new Horizons report, Wood Mackenzie said India has a "unique opportunity" to become a "leading low-carbon economic powerhouse" by 2050. Its net zero 2050 scenario showed how India can achieve decarbonisation and become a $13 trillion economy by investing in clean energy technologies and market-driven policies.

The report, titled 'Chance of a lifetime: can India show the developing world a unique path to net zero?', presents a radical approach for India to achieve net zero while also industrialising and supporting its fast-growing population.

Prakash Sharma, Vice-President, scenarios and technologies research at Wood Mackenzie explained: "Our analysis of how India can reach net zero by 2050 – two decades ahead of its current pledge – is highly ambitious, extremely challenging and without precedent – but it is possible. Infrastructure investment and maximising its unique human talent are key tenets of its transition. If successful, India will offer a different energy transition pathway for other developing countries."

The Indian government's Panchamrit initiative, first presented at COP26 in 2021, aims to promote the rapid development of renewable energy. The comprehensive five-point strategy includes setting an ambitious target of generating 500 GW of non-fossil-fuel electricity by 2030, equivalent to Europe's current combined solar and wind capacity. India must nearly triple its non-fossil-fuel capacity in just six years to achieve this goal.

"Rapid growth in renewables is essential to electrifying India's energy economy," said Roshna N, research analyst, scenarios and technologies research at Wood Mackenzie. "Currently, the country is ranked fourth globally in installed renewable capacity, contributing to about 43 per cent of the total power generation capacity, including hydro. If India can fulfil 50 per cent of its energy needs with non-fossil fuel sources, it could lead to a cumulative reduction of 1 billion tonnes of carbon emissions by 2030," Roshna added.

Recent announcements such as last month's signing of a Memorandum of Understanding (MoU) between Avaada Group and the government of Gujarat will accelerate the pace of the country's transition. This strategic alliance aims to set up hybrid wind-solar projects with an aggregate 6 GW capacity in the state.

But despite its overall move to clean technology, India still continues to approve new coal plants. In January the government's Cabinet Committee on Economic Affairs (CCEA) approved equity investments of Rs56.07 billion ($674 million) by subsidiaries of Coal India in two coal fired power plants with a combined generation capacity of 2.26 GW.

Philippines pushes for faster coal plant shutdown

The Philippines Department of Energy (DOE) is pushing for a voluntary early and orderly decommissioning or re-purposing of existing coal fired power plants in line with the Philippines' energy transition programme.

The DOE said the country's power sector set-up is market driven and privately owned, with the regulator's role limited to ensuring the competitive environment for the sector. This makes the Philippines unique compared to other countries, most especially in Southeast Asia, it said.

As a result, the DOE noted that decisions by private businesses to retire coal fired power plants and shift to full renewable energy are also purely market-driven and based on the economics of which projects will provide the most return to investors.

In addition, the agency said the Philippines is one of the few countries in Southeast Asia which does not subsidise its power sector.

"Unlike other countries which are energy-source rich and use export revenues to subsidise their power sector, the Philippines only relies on cross-subsidy to provide support to its marginalised consumers, as well as for renewable energy incentives," the DOE said.

"Therefore, the costs of transition, as well as the need for greater investment infrastructure, will be fully borne by our already overburdened electricity consumers if we will not find strategic ways to shift the burden," it said.

The DOE said a voluntary early and orderly decommissioning or re-purposing of existing coal fired power plants must be done while securing a stable supply and addressing the climate emergency by ramping up renewable energy to 50 per cent share by 2040.

"In all of these, adequate and timely access to climate financing is crucial for the Philippines to equitably and effectively pursue its energy transition," the agency said.

In line with the government's push for a managed and just coal phase-down, the DOE has lauded the initiative of the Ayala group's ACEN Corp. for the early retirement of its coal plant.

In December at the COP28 climate conference in Dubai, ACEN announced the launch of its Just Energy Transition (JET) Roadmap for the 246 MW South Luzon Thermal Energy Corp. (SLTEC) coal fired power plant in Batangas province.

Indonesia speeds up energy transition

The Indonesian authorities has said that the country is accelerating the development of nuclear power plants as part of its energy transition agenda.

Last month the National Energy Council (DEN) appointed Luhut Binsar Pandjaitan, Coordinating Minister for Maritime Affairs and Investment, to lead the country's Nuclear Energy Program Implementation Organization (NEPIO).

"The NEPIO will not only be tasked to speed up the development plans, but also to regulate the commercial process of the nuclear power plants. But now we are still waiting for further directions from President Joko Widodo before we can immediately move to execute the development," said Secretary General of DEN Djoko Siswanto.

Previously, Indonesia's Ministry of Energy and Mineral Resources (ESDM) said it was accelerating the commercial operation of small-scale nuclear power plants as part of its upcoming energy transition roadmap.

The news follows an announcement in early December that the 660 MW Cirebon-1 coal fired power plant will likely be retired almost seven years earlier than scheduled.

A non-binding framework agreement signed at COP28 by the Asian Development Bank (ADB), Indonesian state-owned power utility company PT PLN, independent power producer PT Cirebon Electric Power (CEP), and the Indonesia Investment Authority (INA) stated that they have conditionally agreed to shorten the power purchase agreement for Cirebon-1 and end the plant's obligation to provide electricity in December 2035 instead of the original July 2042. The transaction is to be finalised in the first half of 2024.

Coal fired power plants typically operate for 40 years or longer. Since Cirebon-1 was commissioned in 2012, retiring the plant in 2035 would avoid over 15 years worth of greenhouse gas emissions. Replicating this transaction with other power plants in Asia and the Pacific and beyond, would achieve significant carbon dioxide emission reductions.

Taiwan to offer 3 GW of offshore wind

Taiwan will launch the second auction of the Round 3 Zonal Development Phase on March 11, 2024 and offer around 3 GW of installed capacity.

Key details for the upcoming offshore wind auction, published by the Ministry of Economic Affairs on November 23, 2023, show the maximum capacity that could be awarded per project will be 1 GW. This includes 900 MW as the maximum and an additional 100 MW for bidders who secured corporate power purchase agreements (CPPAs).

For the latter, the government will require letters of intent signed with at least two companies.

The government will also award proposals of around 700 MW and 500 MW, with the minimum proposed capacity that will be able to participate set at 100 MW.

The application period for the upcoming auction will run until April 10 and the results are expected to be announced in May this year.

Following the auction announcement Germany-based company Skyborn Renewables GmbH, the developers of the Yunlin offshore wind project in Taiwanese waters, said it had secured all approvals to complete the project's financial restructuring and progress with the 640 MW park's construction.

The approvals were awarded by the Ministry of Economic Affairs and Energy Administration following a financial arrangement announced in the summer of last year.

Nuclear projects edge forward

- Czechia plans decision on Dukovany this year
- Estonia and UK affirm SMR plans

Janet Wood

Czechia will cooperate with France to finance joint nuclear energy projects under a new agreement between the Czech Technology Agency and the French National Research Agency.

Czech Industry Minister Jozef Sikela and French Energy Transition Minister Agnes Pannier-Runacher signed a co-operation agreement under which the two countries' entities will be able to apply for funding of nuclear energy projects. They said the two countries also want to continue cooperation in promoting appropriate conditions for developing nuclear energy in the EU – both countries are members of the Nuclear Alliance of 14 EU countries.

Sikela said that in 2024 decisions will be made on the supplier of the new nuclear unit at the Dukovany site and also on the number of new nuclear power sources.

"To successfully achieve these goals, we need the fairest possible conditions for the promotion of nuclear energy within the European Union. I believe that we will be able to rely on the support of France in this respect," he said.

Sikela also backed a proposal to create an industrial alliance to speed up development and deployment of small and medium-sized modular reactors.

Meanwhile in Estonia the government's nuclear energy working group has recommended building a nuclear power plant with small modular reactors (SMRs). The final report of the Estonian government's nuclear energy working group says nuclear energy would support Estonia in achieving climate goals, ensuring energy security and maintaining stability in the energy system.

Fermi Energia Chief Executive Kalev Kallemets said: "If the Republic's government and the Parliament decide to enable the use of nuclear energy in Estonia, Fermi Energia's next step will be to submit an application to the government for more detailed planning and preparation for the construction. This is a task that we have thoroughly prepared with reactor technology vendor GE Hitachi, and supported with dozens of preliminary studies over the past three to four years."

Meanwhile the UK has published a new roadmap to boost its nuclear sector. It includes next steps for exploring a GW-scale power plant as big as Hinkley Point C, to follow Sizewell C, and consultations on new sites and new business models for SMRs. The roadmap has a government ambition to secure 3-7 GW worth of investment decisions every five years from 2030 to 2044 on new nuclear projects.

Prime Minister Rishi Sunak said: "This is the right long-term decision and is the next step in our commitment to nuclear power, which puts us on course to achieve net zero by 2050 in a measured and sustainable way."

The roadmap came shortly before EDF Group announced a further delay to Hinkley Point C and a cost increase. Unit 1 is now targeted to start up in 2030.

TenneT makes connections as it discusses German future

TenneT has received a grid readiness certificate for an offshore connection three months ahead of schedule so that wind farm operator Ecowende can connect turbines at the Hollandse Kust (west) Alpha wind farm to the network.

TenneT's interface and system integration manager Anne-Marie Taris said: "With this, we finished three months ahead of schedule."

In 2016, the Dutch government designated TenneT as the offshore grid operator and the Ministry of Economic Affairs and Climate commissioned five standardised grid connections of 700 MW by 2024. A connection from sea to land has been completed every year since 2019. TenneT has delivered around €8 billion of investments in electricity grid expansion in 2023, up from €4.5 billion investments in 2022, and it expects to invest more than €10 billion in expansion each year.

The company and its shareholder the Dutch state have arranged a shareholder loan facility of €25 billion, safeguarding planned investments in the Netherlands and Germany for 2024/25, while the future of the company's German network is decided. In 2023, TenneT announced that it intended to explore a sale of TenneT's German activities with the German State. To date, no agreement has been reached.

EU ETS funds decarbonisation across the bloc

The EU has recently invested €2.17 billion to help upgrade the energy systems in nine Member States, through 19 selected projects, bringing the total Modernisation Fund investments for 2023 to €4.66 billion for 50 projects. The Modernisation Fund is supported by revenues from the EU Emissions Trading System (EU ETS).

The new investments focus on electricity generation from renewables, modernisation of networks, energy efficiency and replacing coal generation

The new funding includes support for: preparing for a shift to electric vehicles in Bulgaria, Poland and Latvia; PV generation by municipal waste service providers in Croatia; conversion of coal to gas in Czechia and Romania; developing renewable energy capacities in Lithuanian industry and energy efficiency improvements in Slovakia and Estonia.

Wopke Hoekstra, Commissioner for Climate Action, said: "The model of making polluters pay for their emissions, and directing the revenues to investments that support climate action, is at the heart of the European Green Deal. The Modernisation Fund shows how driving down emissions via the ETS helps to speed up the energy transition.

"It is a fair, efficient and effective instrument. We are committed to leaving no country behind in the EU's green transition, and aim to ensure that every citizen can enjoy cleaner air, cheaper energy and other benefits of the energy transition."

- Renewables rise as emissions fall
- Questions remain over coal phase-out

Janet Wood

Renewable energy covered more than half of Germany's electricity consumption for the first time in 2023, covering 51.6 per cent of consumption.

The share of renewables was up by five percentage points on 2022, according to estimates by the Centre for Solar Energy and Hydrogen Research Baden-Wuerttemberg (ZSW) and the Federal Association of the Energy and Water Industry (BDEW).

The proportion of renewables was particularly high in July (59 per cent), May (57 per cent). Onshore wind energy, constituting 22.3 per cent, emerged as the leading contributor among renewables to the overall gross power generation, which electricity supplied by offshore wind declined to 23 billion kWh in 2023 from 25.2 billion kWh in the prior year.

The figures came against a decline in gross power consumption, which fell 4.2 per cent to 517.3 billion kWh. Germany also saw carbon emissions fall by 673 Mt (21 per cent) in 2023, according to Berlin-based think-tank Agora Energiewende's annual review of Germany's energy transition. But roughly half of this drop, which Agora said reflected a "sharp" decline in coal fired power generation, could be attributed to a slowdown in German industrial activity. It said only 15 per cent stemmed from technology improvements such as greater use of renewable energy.

Meanwhile, Germany's plan to build a fleet of hydrogen power plants has hit barriers.

In August 2023, the European Commission cleared a plan that allowed Germany to subsidise a switch to hydrogen for dispatchable power generation. It had plans for 8.8 GW of dedicated hydrogen power plants, and later the switching of 15GW of gas fired power plant to hydrogen by 2035.

However, the annual €7 billion earmarked for this purpose "evaporated" following a ruling from Germany's top court. Recently Siegfried Russwurm, Chair of the Federation of German Industries (BDI) warned that coal power may fill the gap.

He said: "As long as the prospect of new backup power plants based on hydrogen does not get off the ground […] the solution in Germany will be the continued operation of coal fired power plants".

He said an early start on construction was crucial, but with "completely unclear" business models and financing, the hydrogen-fired power plants simply will not happen.

"It would be bizarre and embarrassing if Germany, a country with one of the most ambitious decarbonisation strategies, ended up depending on the continued operation of its coal fired power plants," he said.

BDEW, the German Association of Energy and Water Industries said the Federal government must now "get its act together".

"We need a power plant strategy with clear framework conditions," it said. "At least 15 GW of new secure generation capacity will be needed in Germany by 2030."

Batteries scale-up across Europe but long duration storage needs support

Dutch energy storage developer Giga Storage has announced a battery it claims will be Europe's biggest. Called Green Turtle, the 600 MW/2.4GWh will be built in Belgium, close to a new 380 kV substation. The company expects to commence building this year. Giga Storage aims to have 3 GW of battery energy storage capacity in Belgium by the end of the decade.

The project highlights a trend towards bigger battery projects across Europe. Recently planning permission was granted by local authorities for a 500 MW/1GWh battery in Leicestershire developed by Exagen, and a 100 MW battery at Richborough built on land previously occupied by a coal fired power station.

RenewableUK said recently that the UK's pipeline of energy storage projects has increased by more than two-thirds over the last year, up from 50.3 GW a year ago to 84.8 GW. Operational battery storage capacity has grown to 3.5 GW, with 3.8 GW under construction. The average size of projects has increased to 80 MW.

Barnaby Wharton, RenewableUK's Director of Future Electricity Systems said: "While the battery market is booming, we need investment in even larger projects to store energy for longer, unlocking further opportunities for us to scale-up this cutting-edge technology. We're still waiting for the government to confirm how they will stabilise revenues for long duration projects."

First countries commit to battery energy storage consortium

A collaborative effort to secure 5 GW of battery energy storage commitments by 2024 has gathered a first raft of signatory countries. **Nadia Weekes** reports

Barbados, Belize, Egypt, Ghana, India, Kenya, Malawi, Mauritania, Mozambique, Nigeria and Togo have committed to the Battery Energy Storage Systems (BESS) Consortium, with Indonesia and Vietnam showing strong interest.

These first-mover countries are part of a collaborative effort to secure as much as 5 GW of BESS commitments by the end of 2024.

In order to achieve the estimated 400 GW of renewable energy needed to alleviate energy poverty and slash CO_2 emissions by 2030, 90 GW of storage capacity must be developed.

The BESS Consortium's initial 5 GW goal will help create a roadmap for achieving the rest by 2030, demonstrating a key mechanism for accelerating a just energy transition.

Battery energy storage is critical to increasing grid reliability and accommodating the variability of renewable energy sources. In many cases, a combination of BESS and renewables are already cheaper than fossil fuelled alternatives.

The BESS Consortium is a multi-stakeholder partnership set up to ensure these BESS benefits transform energy systems across low- and middle-income countries (LMICs).

The Consortium is on track to meet its target of securing 5 GW of BESS commitments by the end of 2024 and deploying these by the end of 2027.

BESS Consortium first-mover countries will be supported by resource partners including institutional investors such as the African Development Bank (AfDB), the World Bank, Asian Development Bank (ADB) and Inter-American Development Bank (IDB); development agencies including the Agence Française de Développement (AFD) and German Agency for International Cooperation (GIZ), and companies such as Masdar and Infinity Power, with additional partners and countries expected to join.

The BESS Consortium was established under the remit of the Global Leadership Council of the Global Energy Alliance for People and Planet (GEAPP), which was formed to bring forward transformative initiatives that will cut emissions, create jobs and expand access to clean and affordable energy in low- and middle-income countries.

Jonas Gahr Støre, Norway's Prime Minister and co-chair of the Global Leadership Council, said: "This is only the beginning, we must continue to move at collective speed and scale."

In addition to securing 5 GW of BESS commitments in LMICs and deploying $1 billion in concessional finance, the Consortium will accelerate project deployment, work to improve the regulatory environment, build a favourable market for BESS, and unlock commercial and public financing.

Countries, utilities, and resource partners forming the Consortium will partner to identify and co-develop tailored packages of support for BESS investment.

Joseph Nganga, VP of Africa at GEAPP said that groundbreaking initiatives like the BESS Consortium were driving real, actionable progress.

"We are determined to deliver scalable solutions and measurable outcomes at speed by the time world leaders reconvene at COP29 next," he added.

Türkiye plans 'ambitious' grid and renewables push

Türkiye plans to invest $10 billion in its transmission grid by 2030 and enable the deployment of large quantities of renewable energy capacity, Energy Minister Alparslan Bayraktar has said.

In addition to building the necessary infrastructure, the Energy Ministry is also considering policy changes to create a supportive environment for private investment, according to Bayraktar.

The country's total installed capacity stands at more than 106 GW, with renewables representing more than half.

Türkiye targets reducing carbon emissions by 100 million tonnes cumulatively in its Energy Efficiency Action Plan for 2024-2030, with installed electricity capacity expected to reach 190 GW by 2035, including 60 GW of renewable energy generation capacity.

"The plan is ambitious, and the challenges are many, but through partnership with the international community, including the financial institutions and investors, we can achieve this," Bayraktar said. It is estimated that up to $90 billion will have to come from private investors.

Humberto Lopez, World Bank Country Director, said the bank would support Türkiye in its energy transition effort to modernise and digitise the transmission and distribution grid, and to address key barriers to enable a scale-up of private capital investments.

"We would like to recognise Türkiye for taking the decision to double renewable energy generation capacity by adding 60 GW of solar and wind by 2035," Lopez added.

Noting that the country has devised a plan representing around 10 per cent of its current GDP, Lopez heaped praise on it, saying: "This is one of the most ambitious programmes the world has seen among energy transition countries."

Libya sets 4 GW renewable energy target by 2035

Libya's government of national unity has outlined plans to deploy 4 GW of combined solar and wind capacity by 2035, under the country's National Strategy for Renewable Energy and Energy Efficiency.

The strategy, unveiled in December by Prime Minister Abdul Hamid Dbeibah, aims for a 20 per cent renewable energy share in the overall power mix by 2035.

It targets the diversification of energy sources, investments in renewable energy and increasing energy efficiency, according to Muhammad Masoud Al-Mutaki, Head of the Studies and Development Department at the Renewable Energy Authority of Libya (REAOL).

Libya aims to deploy 1.7 GW of solar photovoltaic (PV) capacity from 2023 to 2025, with a subsequent target of reaching 3.3 GW by 2035.

An additional 600 MW is planned from wind power, with the first 50 MW set to be operational within the next two years. Concentrating solar power (CSP) technology is anticipated to contribute 100 MW by 2035.

Support is foreseen for the installation of solar panels on the roofs of public and private buildings up to a total capacity of 500 MW. Another programme will target the replacement of conventional boilers with those powered by solar energy.

Tanzania's mega hydropower project connected to the grid

Tanzania's power utility company has announced the connection of electricity from the mega Julius Nyerere Hydropower Project (JNHPP) to the national grid. The project will now undergo trial runs.

Government-owned Tanzania Electric Supply Company Ltd. (Tanesco) said that the grid connection represented "a milestone" for the country's electricity generation.

The JNHPP has an installed capacity of 2115 MW and an estimated capital cost of 6.6 trillion Tanzanian shillings (about $3 billion). It is scheduled to be completed early in 2024.

When fully operational, the dam will help reduce and eventually eliminate the power rationing experienced in recent years, Tanesco said.

Masdar agrees gigawatt-scale wind and battery projects in Uzbekistan

- Deal sealed to develop 2 GW of wind and 1.15 GWh of storage
- Four wind and solar projects have already added 1.4 GW to the grid

Nadia Weekes

UAE-based renewables developer Masdar has sealed an implementation agreement with the government of Uzbekistan to develop a 2 GW wind farm project and install 1.15 GWh of battery energy storage capacity in the Central Asian country.

The batteries will be deployed at Masdar's Nur Navoi, Sherabad, Samarkand and Jizzakh solar projects, as well as at the 500 MW Zarafshan wind farm.

The implementation agreement follows an initial pact that Masdar signed with the government in May 2023 for the development of 2 GW of renewables and 500 MWh of storage capacity, which has now been increased to 1.15 GWh.

The agreement was signed on the sidelines of a ceremony for the grid connection of four wind and solar energy projects, developed by Masdar, adding 1.4 GW to the Uzbek power grid.

These include Central Asia's largest wind project, the Zarafshan wind farm, which produced first power in November and is expected to be fully operational in 2024. The other three projects are solar parks located in Jizzakh, Samarkand and Sherabad.

Uzbekistan, which is a key market for Masdar, aims to add 7 GW of solar and 5 GW of wind capacity by the end of this decade.

Meanwhile, South Korea's Hyundai plans to export to Uzbekistan small modular reactors (SMRs) used in the construction of small nuclear power plants.

Hyundai said it has signed a Memorandum of Understanding (MoU) with the Korea Atomic Energy Research Institute (KAERI) to cooperate in the export of technologies used in small reactors.

According to the MoU, KAERI will develop designs for future reactors and licence them, while Hyundai will be involved in business planning, financing, engineering and construction work.

In 2018, Uzbekistan and Russia signed an intergovernmental agreement on cooperation in the construction of nuclear power plants in the Uzbek regions.

Mercom report names top large-scale solar PV developers

- TotalEnergies emerges as top solar PV developer
- Top 10 accounted for 145 GW of projects

Junior Isles

The top ten leading global large-scale solar PV developers have been revealed in the latest annual global report, 'Leading Global Large-Scale Solar PV Developers' released by Mercom Capital Group (Mercom).

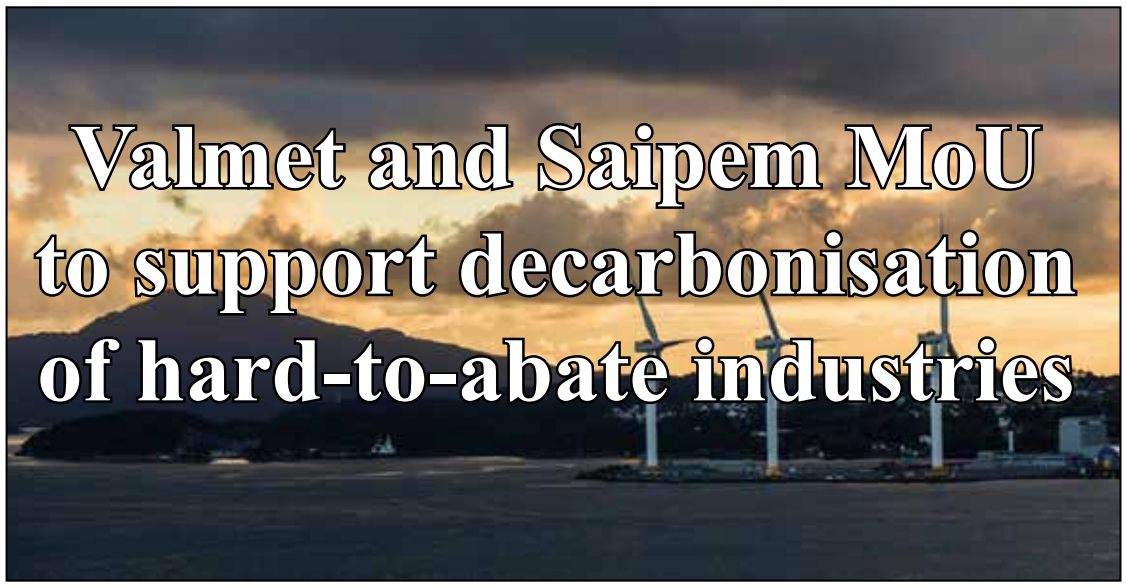
With a total capacity of 41.3 GW, France-based TotalEnergies emerged as the top solar PV developer in the world Adani Green Energy, an India-based renewable energy developer, ranked second with 18.1 GW, followed by Canada-based Brookfield Renewable Partners with 18 GW.

The report, which includes data from July 2022 to June 2023, used set criteria to compile the rankings and ranked developers with projects in at least two countries. Other key criteria included the operational capacity of a project, projects under-construction, and projects with awarded PPA contracts. Large-scale projects with 1 MW or more were considered.

The top 10 developers accounted for 145 GW of operational, under-construction, and awarded (PPA-contracted) solar projects during the reporting period. Of this, 49.5 GW of projects were operational, 29.1 GW were under construction, and 66.2 GW were in the pipeline (i.e. PPA-contracted).

Among the top global solar developers, six were based in Europe, three in North America, and one was headquartered in South Asia. Project portfolios of the top developers were primarily located in North America, followed by Asia Pacific.

"This year's report includes several new companies, primarily led by European developers, but with project portfolios spread around the world. Several leaders on the list are actively transitioning towards solar and other renewable energy sources," said Raj Prabhu, CEO of Mercom Capital.



Valmet and Saipem MoU to support decarbonisation of hard-to-abate industries

Valmet and Saipem have signed a Memorandum of Understanding (MOU) to develop joint solutions to decarbonise the industrial sectors that face significant challenges in reducing their greenhouse gas emissions, also known as hard-to-abate industries.

The companies will collaborate to offer solutions combining Saipem's technologies for CO_2 management with the heat recovery and flue gas treatment units engineered and produced by Valmet for the pulp, paper and energy segments.

"Sustainability is at the core of Valmet's business strategy and operations. In our climate programme – 'Forward to a carbon-neutral future' – we have set ambitious targets as we believe that technology plays a key role in mitigating climate change and global warming in the transition to a carbon-neutral economy," said Lari-Matti Kuvaja, Director, Environmental Systems, Pulp and Energy, Valmet. "We have already achieved our target of enabling carbon-neutral production for all our pulp and paper customers who have access to fossil-free energy sources. We are also continuously improving the energy efficiency of our current offering. Our collaboration with Saipem fully supports these targets."

Fabrizio Botta, Chief Commercial Officer at Saipem, added: "Technology is the key to successfully tackle the decarbonisation of hard-to-abate sectors. Together with Valmet, our ambition is to integrate processes and technologies, providing clients with an end-to-end decarbonised solution in line with their net zero targets."

He added: "This MOU expands Saipem's portfolio of energy transition innovations, further strengthening our unique ability to cover the entire CO_2 capture, re-utilisation and storage value chain, through our drilling, onshore and offshore know-how, assets and technologies."

Nordex achieves order intake of 7.4 GW in fiscal 2023

The Nordex Group increased its order intake for 2023 by 16 per cent to a total of 7.4 GW with 1270 wind turbines. This compared with 6.3 GW and 1235 turbines in the previous year.

The fourth quarter accounted for 420 wind turbines (vs. 386 in Q4 2022) with a total output of 2.5 GW (1.9 GW in Q4 2022). This is an increase of almost 30 percent. The average sales price in euros per megawatt of capacity was €0.84 million/MW

"As expected, we a booked high amount of orders near the end of the year. I am very pleased that, with almost 2.5 GW in the fourth quarter, we were able to achieve another increase compared to the already good third quarter," said José Luis Blanco, CEO of the Nordex Group. "Our product portfolio is proving to be competitive with stable prices. The large number of small projects with a high rated output – particularly in Germany – has made itself clearly felt."

In January, the group said the German market "developed very successfully" in 2023 in terms of the company's order intake and the results of the onshore wind auction rounds.

"It is becoming clear that the government measures to accelerate the expansion of onshore wind are starting to have a positive impact," it stated in a press release.

The group increased its order intake in Germany by 36 per cent, from around 1.1 GW in 2022 (195 wind turbines), to close to 1.5 GW (262 wind turbines) in 2023. The N149/5.X and the N163/6.X, with which the company was able to win orders from its customers in new business, topped the list of turbines in demand.

In the four tender rounds for onshore wind of the Federal Network Agency in 2023, Nordex also secured projects with over 1.8 GW (vs. 763 MW in 2022). On an annual basis, the company's share of megawatts awarded in 2023 tenders reached 30 per cent, including a strong performance in the last tender round with a share of 38 per cent.

"The high market share in the auctions forms a solid basis on which the Nordex Group can continuously expand its role as a developer and supplier of highly efficient wind turbines in one of the world's most important wind markets," said the company.

Siemens Gamesa and Vestas collaborate on standardising wind equipment

Siemens Gamesa and Vestas have signed a new partnership agreement to increase standardisation within the wind industry. The agreement builds on a previous collaboration focused on tower foundations and lifting guidelines.

The partners will initially standardise equipment for the transportation of wind turbine towers. The first project focuses on sea fastening, involving securing towers, blades, and nacelles to installation vessels.

"In 2027, there will be far too many offshore wind farm projects on the drawing board relative to the number of installation vessels available. This presents difficulties for the green transition, for us as manufacturers and indeed for our entire value and supply chain," said Jesper Møller, Chief Engineer in Offshore Execution at Siemens Gamesa.

"Currently, whenever a wind turbine tower is shipped out for offshore installation, the manufacturer welds a box onto the installation vessel to which the tower is then clamped. The process is costly in terms of tons of iron and labour on the quayside. Once installation offshore is completed, all the equipment is removed from the vessel, which is again costly in terms of hours, money and the green transition. Standardisation will allow us quite simply to ship out more turbine parts faster."

The new partnership agreement, facilitated by Energy Cluster Denmark, comprises a series of projects involving equipment for and the storage of huge components produced by wind turbine manufacturers.

The two companies also recently collaborated to streamline the production of wind turbines.

European Energy continues growth with Mitsubishi Capital equity capital injection

European Energy A/S has entered into an agreement with Mitsubishi HC Capital Inc. that will help it strengthen its position in the green energy market.

Under the deal European Energy will receive an equity capital injection of approximately €700 million through the issuance of new shares that will result in Mitsubishi HC Capital Inc. becoming a 20 per cent stakeholder.

Mitsubishi HC Capital will subscribe to approximately 72 million new shares in European Energy. Additionally, Mitsubishi HC Capital will purchase around three million shares from the three major shareholders in European Energy. This will make Mitsubishi HC Capital the second largest shareholder in European Energy.

"I am very pleased to welcome Mitsubishi HC Capital as part of our shareholder group. Their strategic focus aligns perfectly with our current strategy and goal of expanding European Energy's impact in the fight against climate change, said Knud Erik Andersen, CEO and co-founder of European Energy. "The capital injection more than triples our equity, offering us increased opportunities to accelerate our business."

Founded in 2004 in Denmark, European Energy is a leading developer of renewable energy in Europe, with a development pipeline exceeding 60 GW. The company has a diversified technology portfolio with onshore and offshore wind assets, solar PV, and Power-to-X.

In November the company reported a solid quarter in Q3, achieving an EBITDA of more than €78 million and a profit before tax of more than €59 million. The nine-month EBITDA of €127 million was close to the full calendar year 2022 result.

While the divestment of projects contributed to a positive result, European Energy set a record for the largest amount of power generated in one quarter. The company managed assets that produced more than 1 TWh during the third quarter of 2023, of which its own assets delivered some 535 GWh.

Americas

GE Vernova secures 2.4 GW of wind order

Pattern Energy has awarded GE Vernova's Onshore Wind business with a new equipment and long-term service agreement to supply 674 3.6-154 wind turbines for the 2.4 GW SunZia Wind project in New Mexico, USA.

The order is the largest single onshore wind turbine order ever received by GE Vernova, both in terms of number of turbines and GW of generating capacity.

The full SunZia Wind project is expected to be the largest wind power project in the Western Hemisphere at over 3.5 GW total project size.

Wärtsilä to supply energy storage for Tampa

Wärtsilä will supply a 15 MW/30 MWh energy storage system to Tampa Electric Company (TECO), co-located with a 25 MW solar plant in Dover, Florida, USA. The project is expected to become operational by autumn 2024.

The GEMS Digital Energy Platform, Wärtsilä's energy management system, will control the dispatch of the energy storage system.

This will be TECO's second utility-scale energy storage facility.

Upgrade for Cushman II hydropower plant

Tacoma Power has selected GE Vernova's Hydro Power business to upgrade the Cushman II hydropower plant in the USA. The upgrade includes refurbishing two 27 MW/33 MVA turbine and generator units, installing new generator stators and turbine distributors.

The scope of work includes the design, manufacturing, refurbishment, installation and commissioning of two new generator stators and refurbishment of generator rotor poles, shaft thrust bearing, as well as two new turbine distributors and refurbishment of turbine runner and draft tube. The upgrade is expected to be completed in 2026.

The MW Cushman II hydropower plant is located in Mason County, Washington, USA and was originally commissioned in 1930.

Asia-Pacific

BHEL wins 2.4 GW Odisha EPC contract

Bharat Heavy Electrical Ltd (BHEL) has secured an EPC contract from NLC India Ltd (NLCIL) to construct a 2.4 GW thermal power plant in the Indian state of Odisha. The greenfield project will consist of three 800 MW units.

BHEL will supply boilers, turbines, generators and auxiliary systems. The boilers will have biomass co-firing capabilities. The plant will also feature pollution control equipment to control sulphur oxides, nitrogen oxides and particulate matter emissions to meet environmental guidelines.

The project is scheduled for completion by mid-2029.

The major equipment will be manufactured at BHEL's plants in Bengaluru, Bhopal, Haridwar, Hyderabad, Jhansi, Ranipet, Rudrapur, Trichy, and Varanasi. Its southern region power division will be responsible for the civil works and installation and equipment commissioning.

Everrenew Energy awards Suzlon wind contract

Everrenew Energy has awarded an order for the development of a 1225 MW wind power project to Suzlon.

Suzlon will install 75 wind turbines with a hybrid lattice tubular tower at a rated capacity of 3 MW each at Everrenew's sites at Vengaimandalam, Trichy district and Ottapidaram, Tuticorin district in Tamil Nadu.

The order is for Suzlon's 3 MW S144-140m turbines. As part of the agreement, Suzlon will supply the wind turbines and supervise the project, including commissioning. Suzlon will also undertake comprehensive O&M services following project commissioning.

Indonesia appoints AFRY for ESI Assessments

PT PLN Indonesia Power has appointed AFRY to perform Environmental and Social Impact Assessments (ESIAs) for five large solar PV projects located on Java Island. The projects represent a significant contribution to Indonesia's transition towards cleaner energy sources.

The projects include three floating solar PV systems and two ground-mounted PV plants, with a combined total capacity of 500 MW.

Vestas preferred supplier for S. Korea wind project

Vestas has signed a preferred supplier agreement with Hanwha Corporation E&C Division for the 390 MW Shinan Ui offshore wind project in Shinan County, South Jeolla Province, South Korea. The project is developed by Shinan Ui Offshore Wind, a special purpose company established by Hanwha Corporation.

The project will consist of 26 units of V236-15.0 MW turbines, which will be installed on fixed foundations in the southeastern waters of Ui Island. Vestas will also supply 20 years of O&M services.

ib vogt to replace diesel generators in Indonesia

German utility-scale solar developer ib vogt has been awarded a number of solar and energy storage projects by Indonesian utility PT PLN, replacing diesel generators. It has secured 48 projects in western Indonesia, spread across the Java, Sumatra, Kalimantan, and Madura regions. Construction is due to start on early 2025.

The programme involves delivery of 60 MW of solar PV and 175 MWh of storage capacity. The projects will supply electricity to PLN under a long-term PPA.

Europe

Vattenfall selects Vestas for 1.38 GW UK project

Vattenfall has selected Vestas as the preferred turbine supplier for the UK's 1.38 GW Norfolk Vanguard West project. Vestas will supply 92 V236-15 MW offshore wind turbines.

Henrik Andersen, President and CEO of Vestas, said: "Vattenfall and Vestas' shared purpose and values form a great foundation for a long and strong partnership within offshore wind, and it is an immense pleasure to sign and announce these agreements."

In November 2023, the UK government announced plans to raise the maximum price for offshore wind projects by 66 per cent for its next renewables auction round, to be held in March 2024.

Greece opens renewable cross-border tender

Greece's Regulatory Authority for Waste, Energy and Water (RAAEY) has opened a tender for the construction of 200 MW of renewable power plants that will be selling their output on the Greek day-ahead market.

These will offer operating support to wind and solar PV parks located in Bulgaria and Italy. The cross-border competition is facilitated by a law promoting the development of energy projects in the European Economic Area.

Prospective bidders will be able to submit their offers by March 11, 2024, with bids to be evaluated between March 12 and April 17. The list of winners is due to be announced on April 25.

The tender will be open to solar projects with capacities exceeding 1 MW and wind schemes of over 6 MW in size. The bidding price for solar PV projects is capped at €54/MWh, while the maximum price for proposals in the wind segment is €63/MWh.

Westinghouse AP1000 reactor for Ukraine

Energoatom, Ukraine's state-run company responsible for the operation of all nuclear power plants in the country, and Westinghouse Electric have signed an agreement on the purchase of equipment for unit 5 of the Khmelnytskyi nuclear power plant. The reactor will be an AP1000.

Construction of the facilities will begin immediately after the Verkhovna Rada (Ukrainian parliament) passes the necessary law.

Hellenic Cables to supply Polish inter-array cables

Hellenic Cables has won a contract from Seaway 7 to supply inter-array cables for the Bałtyk II and Bałtyk III offshore wind farms in Poland. Hellenic Cables will be the key subcontractor for the design, manufacturing, testing, and supply of approximately 205 km 66 kV submarine inter-array cables and related accessories for the Polish offshore wind farms.

The company is also responsible for the design, manufacturing, transportation, and installation of export cables for the Bałtyk II and Bałtyk III wind farms, together with its consortium partner Jan De Nul Group.

Developed by a joint venture of Equinor and Polenergia, Bałtyk II and Bałtyk III will each have a capacity of 720 MW and connect to the onshore grid via a total of four HVAC submarine cables with a combined length of 256 km.

Spanish wind order for Nordex

The Spanish IPP Capital Energy has awarded Nordex with an order for 106 MW consisting of 18 N163/5.X turbines for the Mareas I & II wind farms near Mequinenza in the province of Zaragossa, Spain. The turbines from the Delta4000 series will be installed on tubular steel towers with hub heights of 108 m. Commissioning is scheduled for June 2025.

The order also includes a 20-year service agreement.

Lithuania opens second offshore wind tender

Lithuania's National Energy Regulatory Council (NERC) has opened the country's second offshore wind tender that is looking for a developer of a 700 MW offshore wind farm.

Interested developers have until 15 April to register and submit their documents and offers, which will then be undergoing evaluation until 27 May. The final confirmation is expected to be announced at the beginning of August, after the developer's compliance with national security interests is verified.

The site in the Baltic Sea where Lithuania plans to build its second offshore wind farm is located 30 km from Palanga and covers 136.39 km^2. Lithuania's second offshore wind farm could be operational by 2028.

Vestas wins contract for Hollandse Kust West VI

Vestas has won an order from Ecowende, a joint venture between Shell and Eneco, 52 V236-15.0 MW wind turbines for the Hollandse Kust West VI offshore wind farm, about 53 km off the Dutch coast.

Turbine installation at sea is expected to begin in the second quarter of 2026. Vestas will service the wind farm under a 15-year service contract.

The wind turbines will be installed on 52 extended monopile foundations, manufactured by Sif, that will have no transition pieces, but secondary steel components.

International

Bergen engines to support Nigeria grid

Bergen Engines has signed an agreement with CGGC-UNPOWER of China to supply 80 engines fitted with Marelli Motori alternators to Malatex, the Nigerian power company.

Phase one of the project – 200 MW to be delivered by 16 Bergen B36:45V20AG gas fired 12.5 MW gensets to Akwa Ibom State – is due for startup in 2024. The remaining four 200 MW phases are scheduled to come on stream progressively by December 2026.

Karpowership orders 1000 MW of MAN engines

MAN Energy Solutions and Karpowership have signed a contract for the delivery of a total of 48 dual-fuel engines for Karpowership's fleet of power plant ships. The engine order consists of MAN 18V51/60DF dual-fuel engines with an output of 20.7 MW each.

The engines will be split between a number of Powerships. In addition to the engines, MAN Energy Solutions will also supply the control systems for the Powerships as well as other electromechanical equipment.

Voith to equip 2 GW hydro plant in Angola

Voith will supply equipment for the 2172 MW Caculo Cabaça hydropower plant in Angola. The order comprises all electrical and mechanical equipment, including the installation of four Francis turbines each with an output of 530 MW, an additional 52 MW Francis turbine, generators, control and auxiliary systems and a customised training concept.

The hydropower plant on the Kwanza River is around 250 km southeast of the capital Luanda in the province of Kwanza Norte. Caculo Cabaça will be connected to the grid there.

The pilot tests were recently completed. Following commissioning of the power plant, around two-thirds of Angolan energy will come from hydropower.

Hydrogen

Huge hydrogen storage project takes shape in Utah desert

Last autumn, US energy giant Chevron announced that through its Chevron New Energies division it had acquired 100 per cent of Magnum Development LLC from Haddington Ventures and in doing so it had become a majority shareholder in ACES Delta LLC, a joint venture between Magnum Development and Mitsubishi Power Americas.

Gary Lakes

ACES Delta is a huge hydrogen storage facility that is currently under construction in the remote desert of Utah, near the small town of Delta. ACES stands for Advanced Clean Energy Storage project. The massive renewable energy endeavour includes a system of 40 electrolysers that will generate green hydrogen out of water, and also two huge underground storage areas carved out of the largest salt dome in the western US.

Along with it, a new power generation facility is being built adjacent to the hydrogen plant that will replace an existing coal fired station that will burn a mix of hydrogen and natural gas.

The project, which is due to begin operations in 2025, has received the backing of the US government with a commitment from the US Department of Energy Loan Programs Office for up to $504.4 million. The facility, estimated at a cost of $1 billion, is expected to be financed through a combination of debt and equity. The new power generation station is estimated to cost $2 billion.

Green hydrogen will be produced at ACES Delta by using solar, wind, hydro-electric and geothermal energy to drive a process known as electrolysis, which will produce green hydrogen (hydrogen that has been produced without the burning of fossil fuels – as is commonly the case today).

The hydrogen will then be stored deep underground in huge salt caverns carved out of the underground salt formation by using solution mining, which involves drilling a well into salt columns and injecting water at high pressure. The water dissolves the salt and the solution is then stored in large containment pools nearby. The two caverns start some 915-1220 m (3000-4000 ft) below the surface and are 60 m (200 ft) in diameter and 365 m (1200 ft) deep. They will have a 1000 MW storage capacity, capable of producing 150 000 MW hours of energy.

Phase one of the project will see green hydrogen produced at 100 metric tonnes per day. ACES will draw excess renewable power from the grid in the spring and autumn when demand for electricity is low and use it to produce the hydrogen that will be stored away until demand for electricity increases in the summer and winter.

ACES is seen as a way to strengthen the electricity grid by having large energy storage available if gaps should appear in the grid. Furthermore, the project is seen as coming to completion at a time when excess energy will be available for the electrolysers to draw from.

Initially, natural gas will be part of the electricity generation side, but over the next 30 years, power generation will be entirely from green hydrogen. The new power plant has been designed to run on a combined-fuel mix of 70 per cent natural gas and 30 per cent hydrogen in 2025. By 2045, power generation is to be 100 per cent hydrogen.

Once the project is complete, it will provide long-duration energy storage and will support the integration of renewable energy sources into the grid. The storage caverns themselves have been described as batteries and eventually there could be 70 or more caverns mined in the giant salt dome, each of which could hold 5500 metric tonnes of hydrogen.

Near ACES, the Intermountain Power Agency is overseeing the construction of a new power generation station that will replace a coal fired power station that has been operating for 40 years. The Intermountain Power Plant (IPP) was opened in 1986 with two coal fired units that produce 1800 MW that average about 13 TWh annually to 35 municipal utility companies through 2.4 GW AC and DC power lines to Utah and southern California.

The power station will run two Mitsubishi Power advanced M501JAC gas turbine power trains in a combined cycle power plant with a capacity of 840 MW.

ACES Delta is keen to complete phase one of the project as it will set the stage for further development and likely lead to the construction of further infrastructure that would expand renewable energy demand in other applications for power generation or long-duration storage.

The hydrogen produced at ACES could be used not only for power generation, but for transportation and by heavy industry as the push for energy transition builds, and by 2050, the Utah desert may hold the capacity to supply green hydrogen to numerous businesses and industries throughout western North America.

Gas

Escalating tension in Red Sea could impact LNG shipments, energy prices

The risk posed by Yemen's Houthi rebels to LNG carriers and petroleum tankers transiting the Red Sea has heightened tensions in the Middle East and prompted many shipping companies to forego the Red Sea/Suez Canal route for the long journey around Africa. As yet, there has been little impact on energy prices and international commerce, but that could change depending on the course of action taken by the Houthis and the US Navy.

Gary Lakes

As of mid-January, there were no LNG tankers in the Red Sea, the CEO of one LNG shipping company reported on X. The huge frozen gas tankers that normally sail through the Red Sea and use the Suez Canal have been forced to reroute their voyages in order to avoid a drone or missile attack launched by Yemen's Houthi rebels, Shia Muslims who are armed and financed by Iran.

The Houthis seized a large area of northwestern Yemen during the last decade in the wake of the Arab Spring, forcing the Sunni government to abandon the capital Sana'a and prompting intervention by Saudi Arabia and the United Arab Emirates.

The Houthis launched their attacks against shipping citing their support for the Palestinians. They stated initially that they were only targeting vessels associated with Israel. But, it was not long before they widened their scope of targets, attracting the ire of international shipping companies and numerous governments.

In mid-January, after several Houthi attacks on commercial shipping in the Red Sea and the Gulf of Aden and after numerous warnings from Western powers, US and UK warplanes struck Houthi missile launch and weapons storage sites but failed to completely destroy Houthi capability to strike at ships off the Yemeni coast.

In spite of concerns about escalating Israel's war against the radical Palestinian Hamas group in the Gaza Strip into a wider regional conflict, the Houthis have continued to strike at ships in the region as well as US and UK naval ships. The US has continued to hit Houthi positions in an effort to degrade their attack capability.

The continual targeting of international shipping by the Houthis has moved Washington to re-designate the group as a terrorist organisation.

A number of energy companies have since stopped their tankers from transiting the Red Sea and the Suez Canal, which normally handles about 12 per cent of world shipping. At mid-month, there had been no announcements of major disruption in gas and oil supply to global markets, and little impact on prices.

Qatar Energy and Shell, both big shippers of LNG, are two companies that have halted shipments through the Red Sea. Qatar is the second largest shipper of LNG in the world. By routing its tankers round the Cape of Good Hope a normal voyage of nine days will double to 18. If this continues over a prolonged period of time it could impact prices for hydrocarbons as well as commercial goods just as trade was getting back to normal after the Covid-19 pandemic.

Qatar, the US and Russia are the big shippers of LNG with average annual shipments through the Suez Canal amounting to 14.8 million tons, 8.8 million tons and 3.7 million tons, respectively. The price of LNG in mid-January showed little movement due to sufficient storage levels in Europe and northeast Asia.

With sufficient stocks of gas in Europe and elsewhere, the crisis in the Red Sea is not one of immediate alarm, according to a recent report on natural gas and LNG demand by Wood Mackenzie that looks at the year ahead.

According to the report 'Global Gas and LNG: 5 Things to Look Out for in 2024', demand for gas will remain low well into this year. It noted that over the last three months European gas prices have declined by 45 per cent to around $10/per million Btu. Combined with a mild winter in the northern hemisphere, gas demand is seen as remaining weak and prices low.

"Global LNG supply growth will remain limited at 14 million tons, but with Asian LNG demand still weak, competition for LNG is unlikely to heat up," the consultancy group said in a statement.

Furthermore, the report forecast that the global LNG shipping market is at risk of oversupply, as 60 new LNG carriers are due to be commissioned in 2024.

According to Wood Mackenzie's Vice President for Gas Research, Massimo Di Odoardo: "Altogether, the 60 new vessels equate to 10.4 million cubic metres of LNG shipping capacity, sufficient to move 54 million tons per annum of LNG between the US Gulf Coast and Europe. There will be limited organic LNG supply growth and the bulk of US LNG is still expected to be routed to Europe, rather than Asia, limiting demand for shipping and pressure on freight rates."

For now, the crisis in the Red Sea and the war in Gaza are having little impact on energy prices, but the sooner these problems are resolved the better. Currently the problems can be seen as contained, but a wider regional conflict will impact just about everything.

Microgrid management is crucial in a clean energy world

The shift to greater electrification and clean energy sources requires the use of digital energy management solutions. More specifically, it calls for the rapid deployment of microgrid management systems, says AspenTech's **Judith Ponniah.**

Electrification is accelerating across all economic sectors as the world comes to grips with increased demand for resources, energy, and sustainability while meeting net zero targets. There is an industry-wide drive towards increased exploitation of renewables, shifting from conventional hydrogen to green hydrogen, and electrification of units such as crackers. However, these cannot be adopted effectively without advanced digital energy management solutions to ensure these assets perform reliably, at lowest cost, and with lowest carbon intensity. The existing grid will need to quickly expand and evolve to support new demand patterns, address grid congestion, and support emission management.

Companies are looking for a category of digital solution, one we call a microgrid management system. This combines aspects of distributed energy resource management systems (DERMS), aspects of and demand-side utilities management.

Another key concern among industry experts is the growing vulnerability and complexity of an increasingly dynamic and distributed grid of power generation, storage and consumption, especially as many regional grid operators have been slow to adopt digital technology. Microgrids and microgrid management systems have emerged as key investment areas to fill the regional void while meeting demand from large power consumers, communities, and localities.

Engineering, procurement and construction (EPC) companies have a major role to play in the uptake of industrial energy management and microgrid solutions. Owners do not have the subject matter experts nor strategic direction to manage, design and implement these systems on their own.

Additionally, the pace with which the industry needs to adopt solutions in this area provides a significant opportunity for EPCs who build up both the supply-side and demand-side energy management expertise, as well as the ability to replace aging power utilities with these more capable and advanced technologies.

The emergence of microgrid management systems are being accelerated by the growing electrification of energy as well as increases in carbon taxes. Microgrid management systems are an important strategic element for the industrial sector to address the key issues of energy security, operational efficiency, and environmental impacts.

The US Energy Information Administration (EIA), anticipates that by 2050, the capacity for global electric-power generation could see an increase ranging from 50 per cent to 100 per cent, while electricity generation itself is expected to grow by approximately 30 per cent to 76 per cent, almost all of that coming from renewables.

To meet this growing regional market demand for electric power with high resiliency and reliability, it is necessary to ramp up electricity resources, particularly from renewable origins. An estimated investment of over $1.5 trillion a year in capacity, grid improvements, low-carbon generating capacity, and transmission and decentralised distribution will be needed to enable suitable electrical generation. In planning, energy companies will need to consider the current situation, that approximately 770 million people cannot access affordable electricity today, most of them in sub-Saharan Africa (International Energy Agency, 2022).

More organisations are decarbonising assets to achieve carbon abatement pledges using electrical power. However, there are challenges ahead.

Grids must be expanded and modernised to rapidly support distributed (renewable) power, power storage and cybersecurity resiliency. Advanced power distribution management and distributed energy management (DERMS) through digitalisation is crucial to keep electric power supply reliable for all consumers and works in favour of the trend toward distributed and storage.

For critical industrial assets, microgrid management systems can optimise and reduce the carbon footprint of the asset owner, and ensure that vital assets do not suffer sudden electric supply loss. This increased reliability and resilience cannot be overstated as downtime due to power outages can result in financial losses. Additionally, these management systems controls allow for optimised energy management, leading to significant cost savings on energy consumption.

The financial impact, the increased flexibility of operations and sustainability benefits are significant but as cybersecurity becomes the next significant issue, microgrids will also play a key role by providing an extra layer of protection that enhances security and protects critical infrastructure. Lastly, they also alleviate stress from regional power providers as industrial users will be able to manage their own power generation becoming an additional source of buffering for the regional grid.

EPCs are working with owner operators to deliver these solutions. With the rush of investments into new innovations by joint-ventures, new partnerships, start-ups, and private equity firms there will be more integration needed to merge purchased power and onsite cogeneration along with integration of intermittent renewable sources and battery storage. The rise of these varied power sources will require critical infrastructure to operate efficiently and maintain operational flexibility. They see microgrid management systems as key to enhancing energy resilience, reliability, and sustainability, especially in critical infrastructure and remote locations. Currently, microgrid management systems are strategic; however, as sustainability initiatives accelerate, they will become an industrial requirement for most industrial owner-operators.

As the goal of the microgrid management system is to centralise the flow of electricity data, controls, and forecasts, this in turn unlocks the following key use cases for both microgrid and self-managed grid operations, such as:

- *Power reliability:* EPCs can design with power reliability in mind, enhancing the reliability of power supply and support local power network 'islanding' by balancing on-site power generation and storage. During early conceptual design phases, the EPCs can look at the trade-offs between capex (capital expenditures) and opex (operating expenditures) to determine if adding microgrids would be feasible. By allowing facilities the flexibility to safely turn down facilities, they can avoid the negative impact of sudden blackouts.
- *Net zero journey:* By including the microgrid energy management solution to an EPC's project track record, they can support their clients in meeting their carbon neutrality objectives by intelligently enabling incorporation of on-site renewable power generation and storage. Owner-operators utilising traditional technologies may use microgrids or deploy renewable generation on-site to support their transition toward electrifying equipment such as refinery pumps, compressors, and other equipment to reduce carbon emissions.
- *Financial performance:* Another key use is to improve the economic outlook of an industrial facility by optimising power generation mix and storage with load demands while creating new revenue streams through active market participation. With some degree of energy independence from the power grid, companies can generate revenue by selling power back to the grid during peak loads while also guaranteeing smooth operations during power grid failures through isolation from the grid.
- *Decision support:* Finally, EPCs can support owner operators with risk management through these industrial microgrid management systems as they can be instrumental in monitoring the state of microgrid components, controlling the operation of microgrid assets, and providing real-time data and analytics to operators. This enhances the situational awareness of on-site grid operations through real-time visualisation, trending, alarms and controls to support strategic decision-making. This information can then be used to optimise maintenance schedules and prevent unplanned outages by identifying potential problems.

As with any technology, it is necessary for owner-operators to ensure that they work with EPCs capable of designing these solutions from the planning project phases. Planning is fundamental to ensure process control and guarantee performance during operations.

Ultimately, microgrids are increasingly available but they need to be effectively combined with the right digital solutions to make them effective within the energy sector. The right digital solution is a cohesive, intelligent scheme that encompasses efficiently designed microgrids integrated with regional grids.

This approach promotes entrepreneurial investments in new power generation strategies and connected storage innovations. In addition to battery storage, innovations such as commercialisation of hydrogen fuel cell storage can be integrated easily.

Added to this, scheduling solutions can be used to improve microgrid operations for long-term planning, optimise the planning of microgrid generation resources versus procurement of energy from the grid, and enhance maintenance strategies of microgrid assets.

The rapid emergence of microgrids marks a significant development in the energy sector. By offering a flexible, efficient, and resilient approach to energy management, microgrids are poised to play a critical role in meeting the growing global energy demands. We are seeing a growing number of use cases in our systems to support microgrids today, demonstrating the practical applications of the technology. Beyond the industrial site opportunities discussed, other emerging areas include airports, hospitals, educational complexes, mineral processing, and critical infrastructure for government facilities.

As the world grapples with the challenges of electrification and the need for sustainable energy solutions, microgrids emerge as a beacon of innovation and practicality. For EPCs and their owner-operator clients, microgrids represent not just a response to current challenges but a proactive step towards a more sustainable, efficient, and interconnected energy future.

Judith Ponniah is Industry Marketing Director at AspenTech.

Ponniah: We are seeing a growing number of use cases in our systems to support microgrids today

Pathways to a low-carbon industrial sector

Laying the foundations for industrial decarbonisation is more crucial than ever off the back of COP28. Edison Group's **Andrew Keen**, analyses the UK's approach.

As the dust settles after the controversial, frustrating, yet historic COP28 at the close of 2023 we are left with perhaps the best outcomes we've seen from the annual gathering so far. Unfortunately, the bar for what makes a successful COP remains extremely low, as agreements – although reached – seem to consistently lag behind the pace needed for meaningful change.

The key question on COP28's agenda was whether a consensus could be reached on an approach to fossil fuels – would they be phased down, or phased out? President Al Jaber's pre-conference focus on the rise of renewable energy was persistent, declaring that COP should set a target of doubling energy efficiency and tripling global renewable energy generation by 2030. Many criticised this as a tactic, employed to avoid addressing action on fossil fuels.

While the first draft of the text included the ill-fated word "could", offering countries more of a choice in the matter than would be feasible to reach meaningful targets, the final text replaced it with a call for the world to "transition away" from fossil fuels. While still a weaker instruction than many would like, what is remarkable is the new definition this has prescribed to fossil fuels.

Some reserves of fossil fuel will never be developed and are now what is described as a stranded asset. Germany's climate envoy, Jennifer Morgan, confirmed as much: "Now the signals are clear. If you're an investor, the future is renewable. Fossil fuels are stranded assets."

For a country that is 78 per cent reliant on fossil fuels for its energy – oil, gas, and a bit of coal – this is a development that leaves the UK exposed, but equally presents great opportunity. Its dependence on oil and gas has come into stark visibility over the last 18 months, as we have faced the biggest global fossil fuel price shock since the 1970s with Russia restricting the supply of gas to continental Europe.

Not only is it important that consumers adopt renewables – a large piece of the puzzle will be incentivising investors to do the same. Long-term, the most cost-effective path to decarbonisation lies in the markets, which means that the government will need to assist comprehensively in helping the industry secure the investment needed to make the low-carbon transition. Providing certainty over net zero ambitions for industrial sectors; deploying funding mechanisms to support the use of carbon capture technologies; and the potential of using carbon pricing as a tool to send a clear market signal are all methods of encouraging growth of new, low-carbon sectors in the UK, and investor interest in these sectors as a result.

From an industrial perspective, decarbonising is a core part of the government's plan for the green revolution. The UK's industrial outputs are vitally important to its economy, contributing £170 billion each year and providing 2.6 million jobs. Using the next decade to lay the foundations for industrial decarbonisation is more crucial than ever off the back of COP28, following the signing of fossil fuel combustion's death warrant.

Hydrogen is an exciting space for the low-carbon movement right now, caveated with the fact that production at significant scale is yet to be achieved. In January 2023, the German and Norwegian governments agreed to cooperate on development of clean hydrogen supplies and carbon capture technology – a positive sign for innovation and development of the energy class. A supportive environment is needed for the widespread adoption of hydrogen technologies, something that will take business, policy, and community collaboration to achieve. As a fuel, hydrogen produces only water vapor when used in fuel cells, making it a considerably cleaner alternative to traditional fossil fuels – and potentially a gamechanger in the UK's clean energy production, transportation emissions, heating and power generation, energy storage, and renewable electricity grid balancing.

Carbon Capture Usage and Storage (CCUS) is a technology aimed at capturing carbon dioxide (CO_2) emissions from industrial processes and power generation, preventing them from being released into the atmosphere. Crucially, CCUS creates a path for industries which cannot decarbonise at the pace we require – like cement, steel and chemicals – to join the green revolution in a manageable way. In October 2023, UK Secretary of State Claire Coutinho outlined the potential for carbon capture in her opening speech at the Carbon Capture & Storage Association annual conference. Her announcements put the UK on track to achieve between 20 and 30 million tonnes of captured and stored carbon dioxide a year – the equivalent of taking 4-6 million cars off the road each year from 2030. If this target is achieved, it will support 50 000 jobs by 2030, and add £5 billion to the economy by 2050.

Keen: transitioning to low-carbon alternatives is not entirely centered around new classes of energy

Despite the opportunities presented by hydrogen and CCUS, transitioning to low carbon alternatives is not a feat entirely centered around new classes of energy. Supporting existing industrial sites to maximise their energy and resource efficiency is a critical strategy in decarbonising the UK's energy sector – for example, initiatives like comprehensive energy audits and efficiency assessments, support for businesses in adopting energy-efficient technologies and equipment (financial incentives or grants can significantly help in offsetting these initial costs), encouraging the adoption of circular economy principles (where waste materials are viewed as valuable resources), and both public and private investment in R&D initiatives to speed up the development of innovative technologies. Furthermore, simple changes like the implementation of energy management and monitoring systems – required to track energy consumption – can go a long way towards providing industrial sites with the real-time information they need to make changes.

Perhaps slightly less exciting, but equally as important and innovative as the suggestions above, is the need for a set of transparent, standardised clean energy assessment guidelines – creating a trustworthy compliance industry to inform decision making by investors, and legitimising investment in the industry overall.

Targeting industrial clusters is also important. Industrial clusters are places where related industries have co-located, and are an area of considerable investment from the UK government in its overall green energy strategy. The benefits of industrial clusters stem from the utilisation of shared infrastructure, opportunities for learning, and innovation sharing. There are a number of industrial clusters of various sizes, locations, and emission levels across the UK, notably in Humberside, South Wales, Merseyside, Grangemouth, Teesside and Southampton.

Many of the clusters are in relatively deprived regions and often act as a driver of prosperity for the surrounding area, as key employers pay above the UK median wage. Targeting the UK's industrial clusters as the first point of call for the consultation, engagement and rollout of low carbon improvements makes sense from an efficiency perspective, and if successful, will help the UK to make the most progress towards feeling the benefits of clean growth. Understandably, however, this transition will not be without its challenges.

Most notably, the success of low carbon initiatives in the UK's industrial clusters hinges on the active participation of the community. Decision making, project development and transition timelines must have a decent degree of buy-in from local communities, else they face resistance and longer-term challenges to full integration. High initial costs, social inequalities, public education and technological awareness should all be key considerations in the government's approach to decarbonising industrial clusters across the UK.

COP28 highlighted that traditional fossil fuels are ultimately in terminal decline – a fate that has been written on the wall for some time now. Thankfully, the UK has already made significant strides towards a low-carbon energy sector, with measures in place to help the industry secure the investment needed to make the low carbon transition. Hydrogen, CCUS, and supporting the transition of existing industrial sites and clusters are key focuses for the government throughout this transition, although an increased focus on creating a trustworthy compliance industry and fostering active community engagement would be beneficial for accelerated change. The UK's industrial outputs are vitally important to its economy – so to watch the sector make the green transition is of huge importance not just to overall emissions, but to its position as an innovative leader on the world stage.

Targeting industrial clusters for the rollout of low carbon improvements makes sense from an efficiency perspective

Renewable energy set to soar as interest rates fall

Interest rates in major markets may have peaked. A majority of capital markets experts are forecasting multiple cuts in the US, the EU, and other countries in the coming quarters. The fall will lower the cost of capital and the required investment returns for renewable energy projects. This bodes well for the growth momentum of the sector, which has been expanding at a fast pace despite the many hurdles, writes **Joseph Jacobelli**

The huge additional capacity of renewable energy in recent years is undeniable. A variety of data indicates that the push will continue, if not accelerate, in the years to come. One example of many, is a 2023 report by the International Renewable Energy Agency (Irena), which illustrates that between 2015 and 2020 about $650- 800 billion was invested annually on transition-related technologies. In the following two years, funds invested jumped to $1.1 trillion and $1.3 trillion – increases of 31 per cent and 19 per cent year-on-year, respectively.

The negative economic impact of the Covid pandemic and significant geopolitical disruptions did not halt the advance. Detailed data for 2023 is yet to be published but so far, some of the data indicates that last year was a record year. The International Energy Agency (IEA) reported in 2024 that the 2023 capacity increase was 510 GW, a rise of 50 per cent versus 2022. The chief engine of the advance was China while other regions such as Brazil, the EU and the US also logged in record high additions.

There are still many stumbling blocks to the rapid development of renewable energy. In its 2024 report, the IEA mentions a number of challenges. In developed countries, they include the addressing of policy uncertainty driven by the global economy's fragile state, grid infrastructure shortcomings or under-investment, and administrative and procedural hurdles. Issues in developing countries involve access to financing, raising governance levels, and improving regulatory frameworks.

Objectively, none of these obstacles are new. Developers have faced many of these drawbacks for a number of years. Also, broadly speaking, many nations are making slow but positive changes on some of these fronts. Another challenge highlighted by some is the supply chain bottlenecks. It is a problem which first appeared during the Covid pandemic and then worsened when Russia went to war by invading Ukraine.

These disruptions have affected the delivery of equipment as well as that of the raw materials to the manufacturers of the equipment. Now, the supply chain bottlenecks have seemingly peaked as the Covid pandemic subsided. The current Red Sea navigation crisis may negatively put pressure on renewable energy equipment supply chains, this is likely to be resolved in the short-term.

Another prominent challenge is the higher cost of capital. A subject which is not as much of a headline grabber as some of the others mentioned. The substantial increase in the cost of borrowing money in the US, the EU and other countries has had a detrimental effect on the renewable energy industry (see box for details on how interest rates impact renewable energy investments).

The US Federal Reserve raised interest rates in March 2022, the first time in over three years. It subsequently hiked them 11 times, with the last increase announced in July 2023. The European Central Bank (ECB) embarked on a series of ten interest rate hikes starting in July 2022, through September 2023. The rate jumped to 5.50 per cent from 0.25 per cent in the US and to 4.50 per cent from zero per cent in the EU. The ripple effect of the hikes extended beyond the US and EU, reaching other important financial markets like Australia, India, and the UK.

In contrast to the past few quarters, the outlook for interest rates has brightened considerably. A recent headline in the *Financial Times* stated: *"Gearing up for the year of interest rate cuts: central bankers get their scissors out"*. This echoes the thoughts of the majority of financial markets experts. They expect both central banks to cut rates at least once in 2024. Depending on the direction of inflation, it is possible that the two may actually cut rates multiple times in 2024. With further cuts expected in 2025. At the same time, another general expectation is that rates will not go back to the virtually zero per cent level, last seen in the first half of 2022.

Higher rates impact financial investors and corporations alike. Think-tank Positive Money Europe argued in an article that there was evidence that higher rates do indeed slow down renewable energy investments. For example, high financing costs had negatively affected the construction of new offshore wind farms in Belgium and the UK. These projects attract corporate investment, financial investors, or groups of investors.

Another example is from US renewable energy developer NextEra Energy Partners. Last September, it adjusted its three-year growth target downward blaming tighter monetary policy and higher interest rates. A *Reuters* headline confirmed this impact, stating: *"Renewable energy investors squeezed by higher interest rates, costs"*, in an article related to S&P Global's 2023 annual CERAWeek, a renowned energy markets conference.

All this begs the question: will the multiple rate cuts in the coming quarters boost investments? They will, albeit the outcome will not be immediate. There will be a lag effect.

Firstly, for investments in brand new projects, corporations and financial investors may take a wait and see approach as to the extent of the rate cuts (i.e. why borrow today at 5 per cent when you know you can borrow tomorrow at 4 per cent). Secondly, for existing projects and facilities, a change in the rates do not necessarily immediately affect the rate of investment return. The project may already have loans in place being paid a certain interest rate, possibly fixed over a number of years, as well as other types of financing, such as sustainability-linked bonds. It will take time before unravelling or refinancing the project's borrowing.

In essence, the expected rate cuts starting sometime in 2024, will raise the amount of renewable energy investments though the boost may be delayed by a few quarters after the cuts begin.

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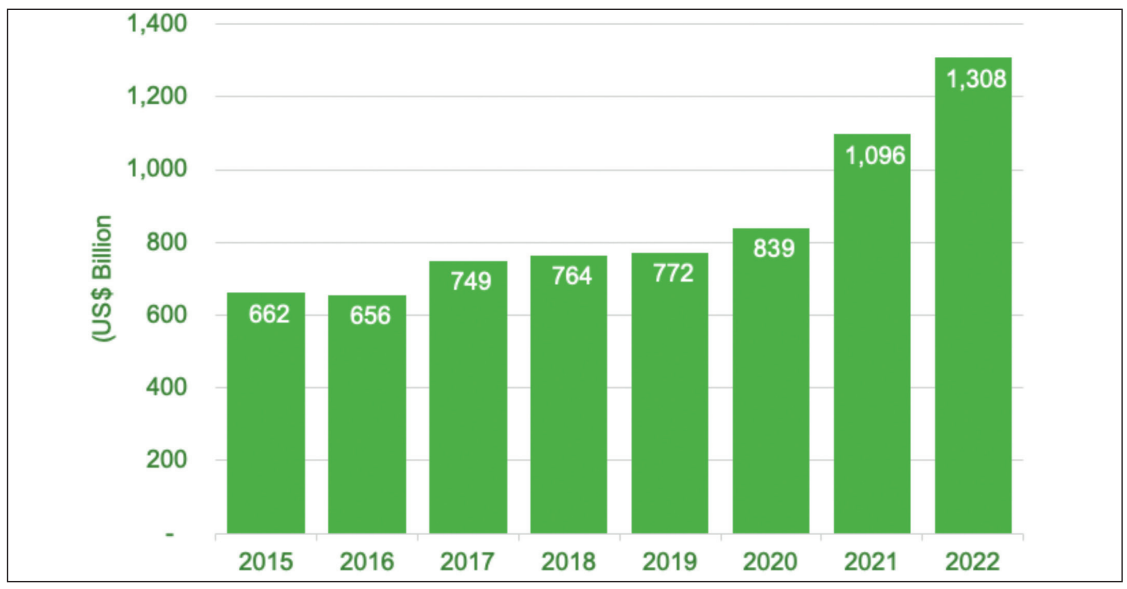
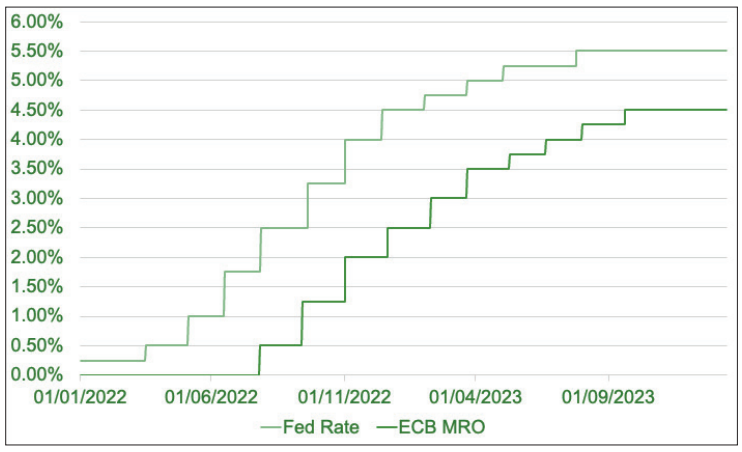


Global investment in transition-related technologies
Note: see source for important details on the data.
Source: International Renewable Energy Agency & Climate Policy Initiative (2023). Global Landscape of Renewable Energy Finance 2023. [online] www.irena.org, Abu Dhabi: International Renewable Energy Agency, p.10.



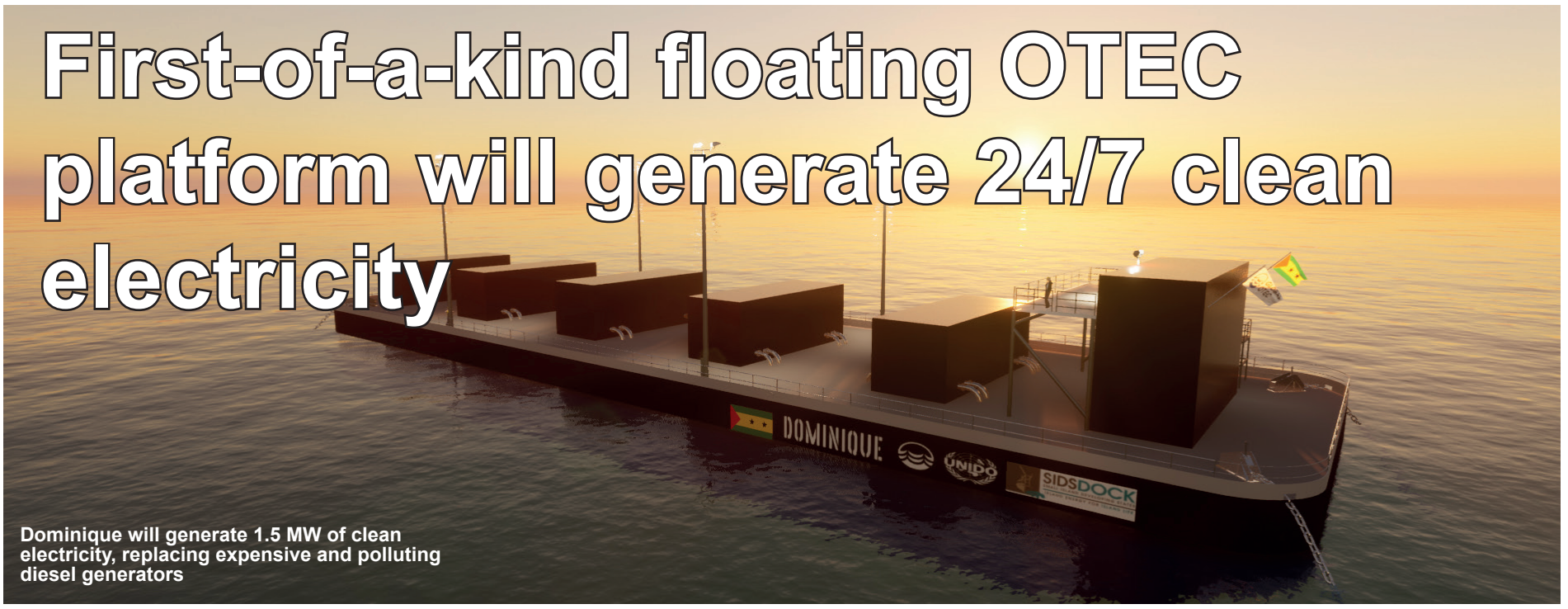
US and EU interest rates
Notes: US – Federal Reserve fund rates determined by the Federal Open Market Committee, a branch of the Federal Reserve System; EU – European Central Bank (ECB) interest rate on the main refinancing operations (MRO), which provide the bulk of liquidity to the banking system.
Sources: US Federal Reserve and ECB.

Interest rates and the cost of renewable energy

- The cost of producing electricity from renewable energy sources like solar and wind power is influenced by equipment costs, interest payments, and O&M (operations and maintenance).
- Unlike fossil fuels, which have fluctuating fuel costs, renewable energy costs are more stable.
- However, interest rates can meaningfully impact the overall cost of the output per kilowatt-hour (total electricity produced/total costs) given the large upfront investment.
- Example: a renewable energy project developer borrows 80 per cent of the cost of a $1 million solar farm to be repaid over seven years. The interest payments at a one per cent rate would total $56 000. However, at a 7 per cent rate, the interest payments would skyrocket to $392 000. A difference of 600 per cent.

Source: Author

First-of-a-kind floating OTEC platform will generate 24/7 clean electricity



Dominique will generate 1.5 MW of clean electricity, replacing expensive and polluting diesel generators

Ocean Thermal Energy Conversion (OTEC) is seeing another wave of interest.
Global OTEC's project in the African country of São Tomé and Príncipe, aims to demonstrate this renewable technology, which can deliver consistent and reliable power output all year round.

Harnessing seawater to generate electricity is not a new idea. The roots of this technology, called Ocean Thermal Energy Conversion (OTEC), can be traced back to the 19th century when scientists and inventors began contemplating the possibility of using the temperature difference between the ocean's surface and its deeper layers for power generation.

The first person to envision this was French physicist Jacques Arsène d'Arsonval in 1881, and since then, several demonstrations worldwide have proven the concept, including the operating OTEC demonstrations in Hawaii, USA, and in Okinawa, Japan.

Although different countries have tried to implement the technology over the years, OTEC ended up being forgotten in the renewable energy mix, due to several factors. Partly due to a lack of investment and popularisation of other sources, but the application of OTEC in economies that were funding renewable energy R&D advancement was limited. OTEC has experienced waves of interest over time, notable in the late '70s and again in the early 2010s.

It appears that another wave of OTEC interest is underway, in part thanks to the global energy transition, but this could also be in part due to British startup Global OTEC. Drawing on past OTEC experiments, the company found an innovative solution to reduce costs and make the technology more viable. Focusing on a market left behind in the renewable energy transition, the Small Island Developing States (SIDS), the company scaled down the structure with its first-of-a-kind floating OTEC platform, named Dominique. This not only reduced the costs of OTEC implementation but also ensured that SIDS could finally generate clean electricity with a technology that meets their needs and fits their specificities.

Set to be installed in the African country of São Tomé and Príncipe, in the Gulf of Guinea, Dominique will generate 1.5 MW of clean electricity, replacing expensive and polluting diesel generators. Subsequent platforms will be installed to increase power generation and meet the full demand of the country and its more than 230 000 people. The commissioning of Dominique is expected to start by the end of 2025.

The project's next step is to conduct a seabed survey so that the detailed design of the project-specific system can progress. Once complete, the construction and installation can begin.

Global OTEC plans to replicate this project in other SIDS, with countries such as Belize, Fiji, Grenada, and Tonga already expressing interest in the technology. "A pipeline of 700 MW of OTEC projects has been identified through the Global Ocean Energy Alliance across tropical islands with little choice but to continue importing diesel fuels for their baseload power," highlights Global OTEC Founder and CEO Dan Grech.

On the technical front, the project has made important advancements in 2023, with the Approval in Principle (AiP) from Lloyd's Register (LR) for the OTEC platform. The LR AiP process serves as an early validation, instilling confidence in technology developers by confirming their capability to align with existing codes and standards. This acknowledgment underscores Global OTEC's commitment to meeting the structural prerequisites for OTEC technology.

Another noteworthy achievement was the attainment of a Certificate of Approval for the Cold-Water Riser installation methodology essential for the offshore OTEC platform. This crucial step in the design process involved leveraging established standards from the oil and gas industries, ensuring a robust approach to OTEC deployments.

The certificate, issued by the Marine Warranty Surveyor company ABL Group, was particularly important given the technical challenges faced by OTEC installations and the long history of OTEC's unsuccessful implementations.

"Thanks to the oil and gas sector, we are able to learn from experiences spanning several decades of designing, installing and operations in the ocean. The standards and regulations as a result of this industry lower the risk and improve the investment case for most ocean-based renewables. Due to OTEC's need for floating platforms and deep-water riser pipes, our technology particularly benefits from this," said Grech.

OTEC has the potential to decrease energy costs and stabilise the price of electricity, reducing the frequency of blackouts and preventing economic shocks from political events while helping islands meet the UN's Sustainable Development Goals (SDGs).

In contrast to other clean energy sources requiring extensive island land use and weather-dependent operations, OTEC's offshore foundation ensures a continuous, 24/7 electricity supply. Leveraging the consistent warmth of surface seawater day and night throughout the year, OTEC outshines other renewables, with 1 MW of installed OTEC capacity equivalent to 5 MW of solar power or 10 MW of wind power. Global OTEC's innovative strides mark a pivotal chapter in the resurgence of OTEC technology, poised to reshape the renewable energy landscape for island nations.

OTEC harnesses the vast energy potential stored in the world's oceans. During an average day, the 60 million km^2 on the surface of the tropical area of the ocean absorb one quadrillion megajoules of solar energy. To release the same amount of energy through fossil fuels, we would need to burn 170 billion barrels of oil.

Operating within a closed cycle, the Global OTEC system navigates pressures ranging from 10 bar to 6 bar, with ammonia as the chosen working fluid. Temperatures of 24°C and 11°C correspondingly facilitate the vaporisation and condensation processes. This perpetual cycle, fuelled by the temperature differential between warm surface seawater and cold deep seawater, powers a turbine, generating mechanical energy for a conventional electricity generator. This continuous and cyclical process allows for a consistent and reliable power output, as the tropical ocean waters remain warm day and night, all year round.

Because of that, OTEC can address the intermittency issues associated with some other renewable energy sources, like solar and wind. And as the structure is positioned offshore, there is minimal land impact. Plus, switching fossil fuels to clean energy allows the countries to stabilise the price and even lower electricity costs.

In its pursuit of a full-scale commercial OTEC platform, 500 kW turbines are employed, strategically chosen to optimise system efficiency. The design incorporates a robust steel hull, ensuring ample space for equipment and pipework. Unlike a concrete hull, this steel structure allows for under deck refrigerant storage, maintaining a smaller form factor. The planned dimensions for the platform are approximately 90 m x 28 m x 5.5 m, for more efficiency and functionality.

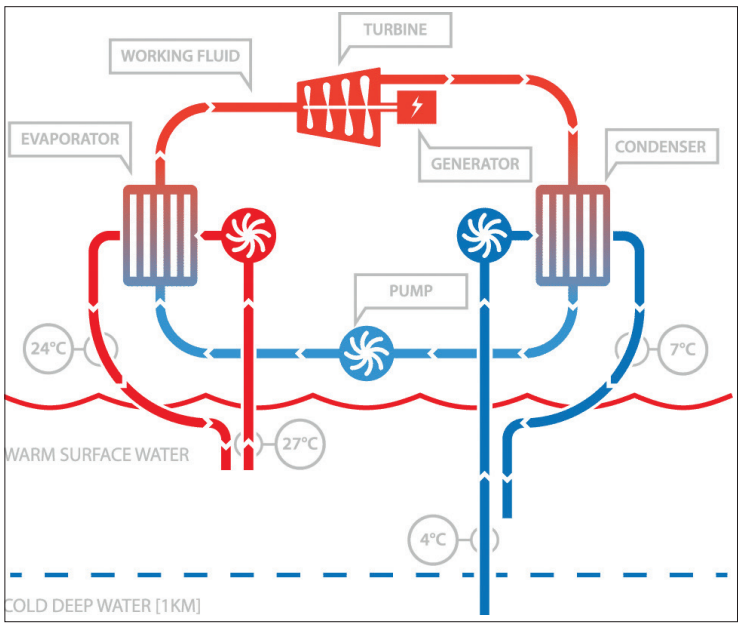
During the International Vienna Energy and Climate Forum last November, advanced concepts of Dominique were unveiled. "This design evolution reflects our team's continuous efforts to enhance functionality and cost-effectiveness of OTEC, as we introduced our proprietary modular concept for the platform's power generation systems," said Grech.

Delving into the structural specifics, the barge is designed with two decks. Employing a non-redundant 4-point spread moored configuration, the barge's positioning for the São Tomé and Príncipe project involves mooring approximately 10 km offshore. The location specificity considers varying depths and bathymetry across different areas. While a disconnectable riser is not deemed necessary due to calm sea states, a proprietary disconnection process for severe weather scenarios ensures swift disengagement with minimal vessel assistance.

PLOTEC is a pan-European consortium comprised of Global OTEC with six other contributors: Agru, Cleantech, University of Plymouth, PLOCAN, WavEc, and Quality Culture. Thanks to Horizon Europe funding, the consortium is pushing the boundaries of ocean energy into operations in tropical revolving storm zones.

Using expertise and standards honed through the offshore oil and gas sector, analysis of severe sea states has guided the design of a cylindrical hull capable of surviving in the Caribbean and Pacific oceans. A physical demonstration is scheduled for Q2 2024 in the Atlantic Ocean, ahead of the summer's more turbulent metocean conditions. The structure will validate the performance of the plant in real-world oceanic conditions against the simulation data.

OTEC cycle diagram



Junior Isles

The problem with buy now, pay later

Nuclear energy has always made for a divisive and murky topic. But the recent resurgence in ambition to build new plant, driven by climate change and geopolitics, looks set to cloud the issue still further.

During the COP28 climate summit, for the first time nuclear energy was formally specified as one of the solutions to climate change in a COP agreement. The summit also saw a landmark declaration by 22 countries to triple nuclear capacity by 2050, with two more countries, Armenia and Croatia, later signing the declaration.

According to International Energy Agency, by 2025, nuclear power generation is forecast to reach an all-time high globally. And over the last couple of months there has been a spate of announcements, with several countries around the world committing to plans to start-up or ramp-up large-scale nuclear power as part of their strategy to tackle global warming and at the same time reduce dependence on fossil fuel imports for electricity generation.

Certainly there has not been this level of vocal government support for nuclear in decades.

In late November, Poland approved the development of its second large nuclear power plant. The project, which follows another announced just over a year earlier, is to be built in the Patnów-Konin region, with construction expected to begin in 2026. The projects are part of a plan outlined by the Polish Ministry of Climate and Environment, which aims to reduce coal dependence by building four to six nuclear reactors with a total capacity of 6-9 GW between 2026 and the mid-2040s.

Meanwhile, France is preparing a new energy bill that favours the further development of nuclear power and also recently said it is cooperating with Czechia to finance joint nuclear energy projects under a new agreement between the Czech Technology Agency and the French National Research Agency.

But perhaps the most significant news came from the UK with the announcement of the biggest expansion of nuclear power for 70 years. The goal is to quadruple UK nuclear power by 2050 up to 24GW. The UK is also investing in technology to reduce Russia's dominant position in nuclear fuel production. The government says it will invest up to £300 million in the production of the fuel required to power high-tech new nuclear reactors, known as HALEU, currently only commercially produced in Russia.

Plans to build a new fleet of reactors for the UK have been around for nearly 20 years but the programme has been plagued by cost overruns and delays, and the withdrawal of several private companies as successive governments have struggled to find a financing model.

The bill for the Hinkley Point C reactor under construction in Somerset is now being recalculated. Its costs have climbed to £35 billion in 2015 prices, almost double the original forecast of £18 billion in 2016. In today's money Britain's first new nuclear plant in 30 years could cost £46 billion. At the same time its long-delayed opening, currently scheduled for June 2027, is likely to be delayed once more to 2031.

Such experiences, although perhaps not to this degree, are fairly common for large scale nuclear, and has divided views on the role that nuclear should play.

Dr Doug Parr, Chief Scientist for Greenpeace UK, said: "Every few months the government makes a grandiose public announcement about the future nuclear in the hope that a major investor will believe the hype and step up to fund this 20th century technology, but it isn't working. The energy industry knows that the economic case for slow, expensive nuclear just doesn't add up, and the future is renewable.

"This vague, aspirational announcement with it's unevidenced claims of cheap energy is unlikely to change their minds when there are real reactors overshooting their massive construction budgets and showing them the truth. But it will cause anxiety amongst communities who may be fingered as potential sites for new reactors, and it will cause more confusion, uncertainty and delay over the investment we need in the real solutions: renewable energy, efficiency and an upgraded grid."

According to Capgemini's World Energy Markets Observatory annual report 2023 published at the end of November, Nuclear capacity will have to more than double by 2050 to achieve net zero carbon. This means reaching 870 GW of capacity by 2050, up from 390 GW today. Achieving this, it said, will require not only the development of large reactors and SMRs but also a commitment to extending the life of current reactors.

When assessing the three pathways for increasing nuclear generation, each is in some way problematic.

Life extension is a sensible step and will help plug the gap emissions that many countries are facing.

It is an option that seems to be gaining traction, even in Switzerland, which has decided to phase out nuclear energy. In December it joined six of its European counterparts in a pledge to get all of their electricity from carbon free sources by 2035. In the medium term it will mean that more electricity will come from nuclear power plants again.

"New nuclear power plants are being planned in many countries," said Swiss Energy Minister Albert Rösti. "This is an important form of energy for decarbonisation," he added.

Rösti said that although Switzerland has decided to phase out nuclear energy, and "that needs to be respected for the time being", the Brussels agreement means that "nuclear energy will remain important" for Switzerland for a long time to come.

"We assume that the existing nuclear power plants will run longer than the planned 50 years. We are now assuming at least 60 years," he said. "It won't be possible to achieve the goal of carbon emissions-free electricity without nuclear power plants. "We won't be able to add renewables quickly enough. That takes time."

In January EDF Energy said it plans to extend the life of its nuclear plants in Britain. But Jess Ralston, analyst at the Energy and Climate Intelligence Unit (ECIU) noted: "Prolonging the life of the existing fleet may plug a gap while the government sorts out the funding model, and these huge infrastructure projects actually get underway, but it's not a permanent solution."

Small modular reactors (SMRs) may be an option. And although the first commercial projects of the technology are still at least a decade away, the technology is still on the table.

In late December the Estonian government's nuclear energy working group recommended building a nuclear power plant with small modular reactors. The government and parliament will discuss whether to launch a nuclear energy programme in the country in the coming months.

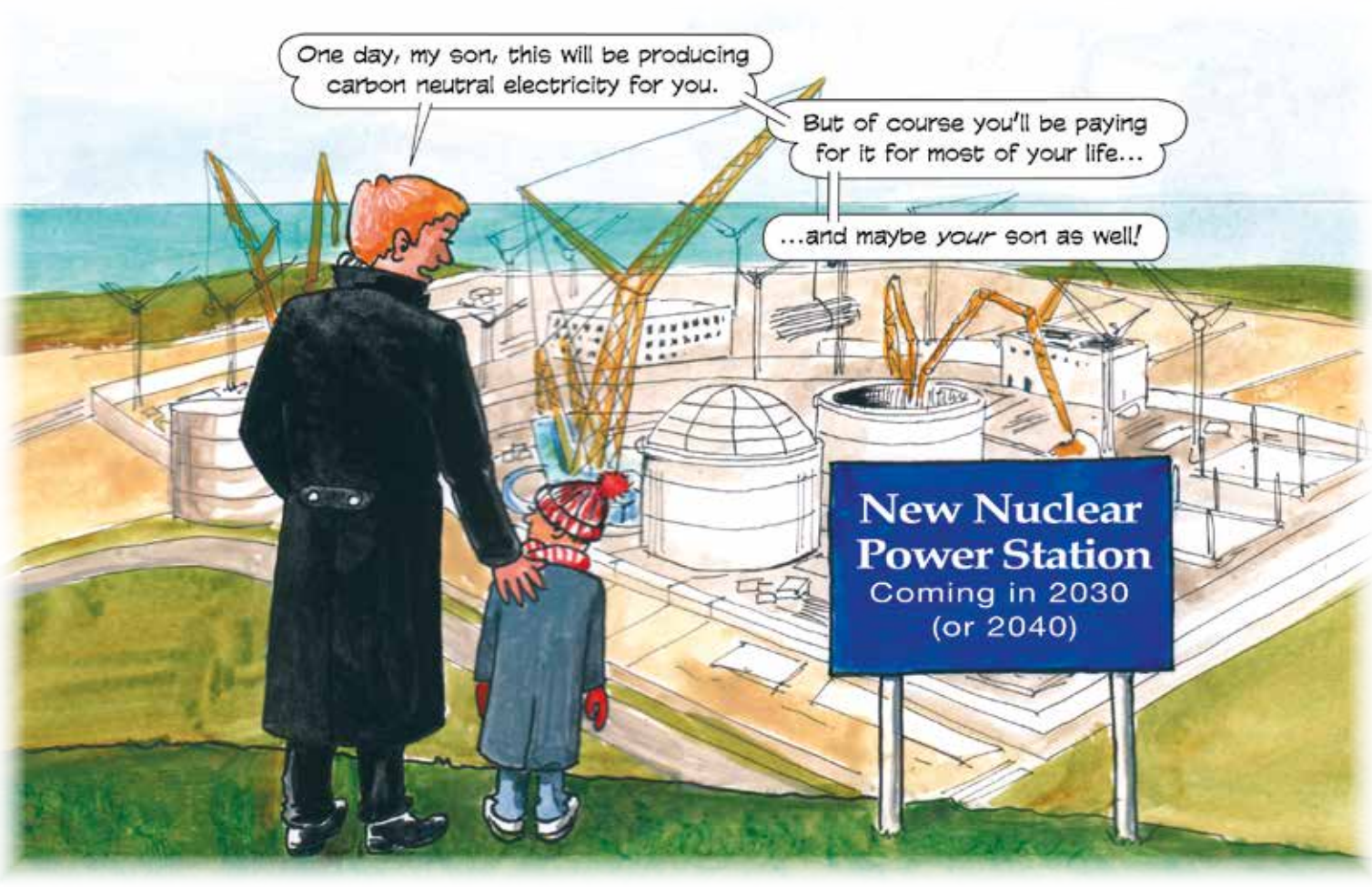
Meanwhile, the pathway to building SMRs in the UK was smoothed in January, with the government announcing that SMRs will be allowed to be built almost anywhere.

Sam Richards founder of pro-growth campaign group Britain Remade, welcomed the news but warned that the building of "game-changing technologies" like SMRs must not be stifled by restrictive planning and regulatory rules.

"Today's news is a welcome first step to delivering a fleet of mini reactors across the country, but the government must go further to ensure SMRs are not caught in the same regulatory bureaucracy as their bigger gigawatt scale cousins," he said.

Nuclear's attraction as a zero carbon replacement for fossil fuelled baseload power is understandable but the time horizon for building new plants does not align with climate change targets. Any diversion of resources and money that stymies renewables and grid development is therefore questionable. Further, the world has not been able to build plants to time and budget despite years of trying.

While the benefits of nuclear are clear, those advantages will be hard to see when we are all paying the price – both economically and physically – of global warming. Under the circumstances, it makes little sense to wait for a Rolls Royce when there are other vehicles that can do the job today. Further, why make a down payment on that Rolls Royce knowing that its price will have doubled by the time it leaves the show room? Any way you cut it, the issue with nuclear is if you buy now, you will pay later.



Cartoon: jemsoar.com