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Facing cost headwinds

How floating offshore wind farms can be developed at a similar cost to offshore wind farms with fixed-bottom foundations. *Page 13*

Understated potential

Despite challenges like bureaucracy and policy uncertainty, Italy's clean energy sector attracts diverse investors. *Page 14*

Final Word

Some old dogs need new tricks, says Junior Isles. *Page 16*

News In Brief

Global energy transition 'entering a new phase'
A new report by McKinsey and Company has revealed that the global energy transition is entering a new phase, marked by rising costs, complexity and increased technology challenges. *Page 2*

Brazil set to take decision on third nuclear unit
A new study into Brazil's long-awaited Angra 3 nuclear power plant says that abandoning the project, which has been under stop-start construction for several decades, would cost almost as much as completing it. *Page 4*

Indonesia progresses on 2060 net zero ambition
Indonesia plans to retire 800 coal fired power plants by 2060 as part of its commitment to achieving net zero emissions. These coal plants will be replaced by gas fired power plants and biomass energy sources. *Page 5*

GB grid operator under pressure to open up market to batteries
A coalition of battery storage developers has called for battery storage technology to be recognised as "critical to Britain's national energy infrastructure" and fix technical problems that have stopped batteries being fully utilised in the Balancing Market. *Page 7*

Egypt to add 3 GW of solar and wind power by 2025
The Egyptian Ministry of Electricity and Energy is planning to enlist the help of private-sector companies to add 3 GW of solar and wind power to the national grid by 2025 under a build, own, operate (BOO) model. *Page 8*

Technology Focus: Harnessing the future
As the renewable energy landscape rapidly evolves, innovative solutions for storing and utilising excess energy have become essential. The Fischells Salt Dome is a "geological marvel" with significant potential for energy storage and conversion. *Page 15*

"Stronger efforts" needed to integrate renewables

Sadamori: the world has seen a remarkable increase in wind and solar

The share of renewables in electricity generation has doubled globally between 2018 and 2023, notably, accounting for half of the EU's electricity in the first six months of 2024 – outperforming fossil fuels. But governments must act to ensure they are well integrated into power systems – or risk losing out on significant benefits, according to a new report.

Junior Isles

As solar PV and wind grow at an accelerated pace around the world, governments must act to ensure that they are well integrated into power systems – or risk losing out on significant benefits, according to a new report from the Paris-based International Energy Agency (IEA).

Published last month, the report – 'Integrating Solar and Wind: Global experience and emerging challenges' – offers a first-of-its-kind global stocktake of efforts to integrate variable renewables across 50 power systems, identifying best practices and key challenges.

The IEA finds that between 2018 and 2023, solar PV and wind capacity worldwide more than doubled, and their share of electricity generation nearly doubled. Fuelled by supportive government policies and continued cost reductions, the capacity of these renewable sources is projected to keep expanding rapidly towards 2030.

However, to maximise the advantages of this additional capacity, these variable renewable energy (VRE) sources need to be well integrated into power systems as they are deployed. According to the report, delaying the implementation of measures to support integration could result in electricity generation from solar PV and wind being 15 per cent lower in 2030 and shave five percentage points off their share of the global electricity mix.

"In recent years, the world has seen a remarkable increase in solar and wind capacity as countries have looked to bolster their energy security and reduce emissions. But they won't reap the full benefits without stronger efforts to support the integration of these technologies into power systems," said IEA Director of Energy Markets and Security Keisuke Sadamori.

According to the analysis, in a scenario in which countries meet their announced energy and climate goals, those that currently have low shares of VRE in their power mixes account for two-thirds of generation growth to 2030. They can typically boost deployment without enacting sweeping, system-wide changes. Well-known and tested measures such as enhancing the flexibility of existing assets and improved forecasting – implemented gradually as the need arises – tend to be sufficient.

Tougher challenges typically materialise at higher levels of solar PV and wind penetration. However, frontrunner systems – including Denmark, Ireland, South Australia and Spain – are finding ways to address these issues, too, clearing the way for others. Developing storage and new power grid technologies, for example, is playing an important role in managing variations in solar PV and wind output throughout the day and across seasons.

According to the report, most technological solutions to address emerging hurdles – namely, a higher need for stability and flexibility – are either mature or nearing maturity, and their successful rollout often lies in appropriate policy and regulatory action

Continued on Page 2

COP29 host putting fossil fuels on the back burner

Azerbaijan, the host country for the upcoming UN COP29 climate summit has omitted the transition from fossil fuels in a list of priorities for the gathering in Baku. In terms of the power and energy sector, it focuses instead on energy storage and grids, clean hydrogen and what it calls green energy zones and corridors.

The president-designate for COP29, Mukhtar Babayev, the Minister of Ecology in Azerbaijan and notably a former Vice-President at state-owned oil and gas company Socar, issued an "Action Agenda" last month which outlines a 14-point list of initiatives and pledges that Azerbaijan plans to put forward to tackling climate change and its impacts at COP29 in Baku in November.

For energy storage and grids, the outcome Pledge will aim to increase global energy storage capacity six times above 2022 levels, reaching 1500 GW by 2030. To enhance energy grids, endorsers will also commit to considerably scaling up investments in grids as part of global efforts to add or refurbish more than 80 million km by 2040.

On hydrogen, the outcome Declaration will unlock the potential of a global market for clean hydrogen and its derivatives with guiding principles and priorities, to address regulatory, technological, financing, and standardisation barriers.

The action agenda also mentions an outcome Pledge that will commit to green energy zones and corridors, including targets to promote investment, stimulate economic growth, develop, modernise and expand infrastructure, and foster regional cooperation.

Although the action agenda includes action on battery storage capacity and widespread expansions to electricity networks, it did not cover plans for the end of fossil fuel use in energy systems that was set down last year's landmark pact in Dubai, where almost 200 countries struck an agreement then described by UN leadership as the "beginning of the end of the fossil fuel era". The burning of fossil fuels is the single biggest contributor to climate change.

Babayev also steered clear of suggesting that Azerbaijan should reassess the dominant role in its own economy of oil and gas exports, which it has said allows it to help meet Europe's energy demands.

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Continued from Page 1

rather than new technological breakthroughs. Even so, incorporating higher levels of variable renewables into power systems requires rethinking the ways in which they have traditionally been planned and operated. This will necessitate proactive measures globally as the rapid uptake of renewables continues, said the IEA.

According to a pair of new reports by research provider BloombergNEF (BNEF), for the first time ever, zero-carbon sources made up over 40 per cent of the electricity the world generated in 2023. Hydropower accounted for 14.7 per cent, while wind and solar contributed almost as much at 13.9 per cent – a new record high, whilst nuclear's share was 9.4 per cent.

'Power Transition Trends 2024', and the '2H 2024 Renewable Energy Investment Tracker', published by BloombergNEF at the end of August, indicate that momentum towards clean power has accelerated, with wind and solar representing nearly 91 per cent of net new power capacity additions in 2023 – up from 83 per cent the year before – while fossil fuels including coal and gas represented just 6 per cent of net new build.

In its 'State of the Energy Union' report – an annual stocktake of the EU's progress towards energy and climate targets – the European Commission revealed that half of the bloc's electricity came from renewable sources in the first six months of 2024, outperforming fossil fuels.

It said that wind power has now overtaken gas as the EU's second-largest source of electricity behind nuclear power for the first time.

A separate report by research firm Wood Mackenzie found that orders for wind turbines increased 23 per cent worldwide in the first half of the year. The growth was dominated by China, which represented 70 GW out of a total 91.2 GW.

"Chinese OEMs (original equipment manufacturers) continue to break records for order intake," said Luke Lewandowski, Vice President for global renewables research at Wood Mackenzie.

Lewandowski: Chinese OEMs continue to break records for order intake

"Conversely, Western OEMs are struggling to keep pace, challenged by China's competitive advantages in pricing and availability. Soft demand in Western markets as well as policy uncertainty, inflation, and other cost pressures have also driven down activity in the US and Europe," he said.

WindEurope's Autumn Wind Energy Data shows Europe built 6.4 GW of new wind farms in the first half of 2024. The data shows turbine orders were up year-on-year and auction volumes are strong but grid bottlenecks are delaying projects.

Current trends and the pipeline of projects and auctions now point to the EU having 350 GW of wind energy capacity by 2030: 296 GW onshore and 54 GW offshore.

The EU target is 425 GW. Today it has 225 GW.

Global energy transition 'entering a new phase'

The energy transition is entering a new phase, says a new McKinsey report. Low-carbon solutions must scale up but are facing an uphill battle as rising interest rates and supply chain challenges limit access to capital. **Junior Isles**

A new report by McKinsey and Company (McKinsey) has revealed that the global energy transition is entering a new phase, marked by rising costs, complexity and increased technology challenges. Growing energy demand and resulting emissions could affect the pace of the energy transition, which will require a rethink of both low-carbon and fossil fuel strategies to meet the goals outlined in the Paris Agreement.

The 'Global Energy Perspective 2024' explores a 1.5°C pathway as well as three bottom-up energy transition scenarios to show the implications of different paths to net zero – providing a fact base to inform stakeholders as they navigate this new phase.

According to the report, global energy demand is projected to grow by up to 18 per cent through 2050, mainly driven by growth in energy consumption in emerging economies (especially ASEAN countries, India and the Middle East).

Renewables are projected to grow to 65-80 per cent of the global power generation mix by 2050 depending on the scenario. Fossil fuels are projected to account for 40-60 per cent of total energy demand to 2050, with fossil fuel demand projected to plateau between around 2025-2035 and begin declining thereafter.

Notably, hydrogen demand is projected to be up to 25 per cent lower than previously anticipated due to cost increases of 20-40 per cent and regulatory uncertainty.

The analysis demonstrates that the build out of clean energy technologies has not been fast enough to meet growing global energy demand. To date, the buildout of renewable energy sources has largely benefitted from the most promising use cases or "low-hanging fruit" where policy and funding have been most plentiful.

Diego Hernandez Diaz, Partner at McKinsey reflected on the findings: "To navigate this critical phase of the energy transition while keeping it affordable, reliable, and green, we need urgent action and a faster pace of change. Even with the surge in global net zero targets, the technologies needed to reach them aren't progressing quickly enough. Low-carbon solutions must scale up, but they're facing an uphill battle as rising interest rates and supply chain challenges limit access to capital."

The report notes that accelerating the pace of the transition will require overcoming several bottlenecks impacting the uptake of low-carbon technologies, including electricity generation and sustainable fuels. This layered with T&D investments needing to grow nearly three-fold by 2050 to recover from under investment and accommodate for intermittent RES, demonstrates the scale of the challenge ahead, said McKinsey.

The report also notes that emissions, which have not yet peaked, are projected to begin their decline between 2025 and 2035.

This latest McKinsey report follows research released by the consulting firm in late August, which revealed the energy sector has a widening "reality gap" between decarbonisation technology project commitments and realisation – threatening the pace of the energy transition in Europe and the US.

The report, 'The energy transition: Where are we, really?', noted that for projects with longer lead times in specific technologies, such as offshore wind, where more than half of Europe's projected pipeline is still pending Final Investment Decision (FID), the industry is quickly reaching the stage at which FID status projects will only come online after 2030 – impacting countries' abilities to reach 2030 Paris Agreement commitments.

Greece calls on Brussels to tackle energy prices crisis

Greece Prime Minister Kyriakos Mitsotakis has called on the EU to urgently tackle a "prolonged crisis" of capacity that has driven prices to such extreme levels that it requires an urgent "political response".

Mitsotakis believes that at present the energy market in southeastern Europe is fundamentally distorted in relation to the prices that Western Europe pays for electricity. Power prices in Greece more than doubled from €60/MWh in April to €130/MWh in August.

In a letter to the European Commission, Mitsotakis called on Ursula von der Leyen to use her second five-year term as Commission President to "take up the task of pushing through more cross-border capacity" to avoid such spikes in future.

Mitsotakis asked Brussels to create a bloc-wide regulator with powers to inspect energy markets across the EU, and urged the Commission to support cross-border infrastructure projects to transfer power between countries.

The EU will need to invest €584 billion in upgrading its power grids this decade, by the bloc's own estimates, to overhaul decades-old infrastructure and ensure grids can carry larger shares of renewable energy.

Days before sending the letter he asked "how it is possible that there is a time of day when the price of the system in the Balkans is ten times more expensive than in Austria or the Czech Republic".

"We say that we have a single market we have a target model but it does not work… I will raise this issue with the President of the European Commission Ms von der Leyen explaining what exactly happened not only in Greece but also in Bulgaria in Romania in Hungary."

Factors in the surge in prices in Greece, Hungary and Romania include hot weather, outages in electricity generation and low rainfall, which had left reservoirs feeding hydroelectric plants dry.

But Mitsotakis said a key driver had also been Russia's attacks against Ukraine's grid. Kyiv was previously a net exporter of electricity but this year has started importing significant amounts of power from its EU neighbours. He believes that the price increase occurs when renewable energy sources RES are disconnected from the system.

"We feel like there is a mini energy crisis that no one is talking about," a Greek government official said, ahead of the letter being sent to Brussels.

The Energy Ministers of Greece, Romania and Bulgaria have now decided to take concerted action to address the shortcomings of the single electricity market in southeast Europe.

Theodore Skylakakis, Greek Minister of Energy, argues that the EU's unified market model is not adapted to the realities of the region. He said that Greece, along with Romania and Bulgaria, is working on a plan to establish a permanent intervention mechanism. This mechanism would be triggered automatically in the event of extreme prices, when supplies from Central European networks to the southeast are insufficient to meet demand.

Energy sector welcomes Future European Competitiveness report

The electricity sector has welcomed the long- awaited report on the future of European competitiveness.

Unveiled by Italian Prime Minister and former European Central Bank Director Mario Draghi, the competitiveness report highlights the need to "accelerate decarbonisation in a cost-efficient way, leveraging all available solutions through a technology-neutral approach".

Draghi said: "This approach should include renewables, nuclear, hydrogen, bioenergy and carbon capture, utilisation and storage, and should be backed by massive mobilisation of both public and private finance."

Eurelectric, the organisation representing Europe's electricity sector, mostly welcomed the report.

Citing the positives, it noted that for the first time, there is a clear call to common funding for electricity grids – at both the transmission and distribution levels – as an essential pre-requisite for achieving EU energy and decarbonisation objectives.

"It is positive to see that the need for reinforced and expanded power infrastructure is now front and centre, together with the development of storage and flexibility solutions," said Eurelectric's Secretary General Kristian Ruby.

It also noted, however, that some aspects of the report are not "market-friendly" and could undermine investor confidence.

According to Eurelectric, the report proposes several untested ideas for reducing energy costs that could use more careful consideration. For instance, the report suggests granting temporary electricity price reliefs for energy intensives.

"While this may appear beneficial at first, it might do more harm than good," warned Eurelectric.

"A regulated price on clean electricity would destroy any investment signals for clean power investors. Increased demand and investor confidence are key elements for ensuring sustained investment in infrastructure and clean electricity generation. We must therefore find the right balance in boosting our competitiveness while also preserving the correct functioning of the market."

Eurelectric added: "Draghi's positions on ETS have also raised a few eyebrows in the power sector, especially with regards to the call for more support for hydrogen and CCUS within the ETS scheme.

"Eurelectric recognises the ETS revenues allocated so far are insufficient for covered sectors to decarbonise at the necessary speed. However, the spending of ETS revenues should be adjusted to current national reality rather than standardised for every country."

Responding to the publication of Draghi's report, COGEN Europe's Managing Director, Hans Korteweg, said: "We welcome the publication of Mr Draghi's report on European competitiveness. Fostering secure access to affordable energy is critical for the EU's industrial competitiveness. To achieve this, European leaders must do more to prioritise and properly reward energy efficiency, including savings achieved by the use of highly efficient cogeneration.

"Increasing the availability of renewable and low-carbon sources of energy, such as biogas/biomethane and hydrogen, is also critical for those industries that rely on cogeneration to ensure a continuous supply of heat and electricity at a competitive cost."

Brazil set to take decision on third nuclear unit

- Billpayers would pay almost as much to abandon as complete Angra 3 project
- Country prepares to add more energy storage

Janet Wood

A new study into Brazil's long-awaited Angra 3 nuclear power plant says that abandoning the project, which has been under stop-start construction for several decades, would cost almost as much as completing it.

Brazil's National Bank for Economic Development recently submitted the study into the technical, economic and legal feasibility of the project to the Ministry of Mines and Energy (MME) and plant's shareholders (ENBPar and Eletrobras).

Angra 3 will have an installed capacity of 1405 MW and if completed, the three plants at Angra will generate the equivalent of 70 per cent of the consumption of the state of Rio de Janeiro.

The project is currently 66 per cent complete. The National Energy Policy Council (CNPE) will decide whether or not to complete the plant.

The amount already invested in the project is almost R$12 billion ($3.86 billion). The report says that the cost of abandoning work would be R$21 billion. To finish the work, which would still take around seven years, the forecast is for an investment of R$23 billion. "The amount would be practically the same as completing the project, but without generating electricity," said Eletronuclear.

According to the state-owned company, the tariff is lower than the cost of several other thermal power plants.

"This is a crucial stage for the continuity of the work and the determination of the commercial tariff for the energy that will be generated by the plant," said Eletronuclear's President, Raul Lycurgo. "We are confident that the work will start soon and that the nuclear sector will once again be thriving in Brazil."

In the past, equipment originally destined for Angra 3 was used to complete Angra 2. A reimbursement programme for that equipment and for fuel originally lined up for Angra 3 but used at Angra 2 would benefit the third by providing cash flow.

The completion will be financed by Eletronuclear and a consortium of banks. But abandoning the project will require the Federal Government to assume the costs, ultimately transferring them to the electricity bill without consumers receiving energy in return, Eletronuclear explained.

Meanwhile, Brazil has recently discussed other new power assets to help support its hydropower-based electricity system in times of drought and accommodate other renewables. Alexandre Silveira, Minister of Mines and Energy, said the government would hold an auction exclusively to contract batteries and energy storage systems.

"I strongly believe that, in the medium-term, intermittent energy (wind and solar) will be stored in batteries and will reduce the cost of energy," stressed the minister, explaining the auction.

Canada's Ontario province has launched the largest competitive energy procurement in its history, seeking up to 5 GW of new capacity by 2034. The procurement, which includes diverse sources, including nuclear, hydroelectric, renewables, natural gas and biomass. The new procurement comes very soon after an earlier procurement that secured around 3 GW. The province expansion is crucial to support large capital projects and meet a forecast 60 per cent increase in electricity consumption.

The government is incentivising projects in particular in Northern Ontario, where it will make Crown Lands available for renewable energy projects. Developers have been told to consider the potential for new infrastructure projects in these regions. However developers have been warned to comply with agricultural protection and land use regulations. These measures include prohibiting solar farms in these areas.

The Independent Electricity System Operator (IESO) was expected to report back with a procurement design framework in September 2024, and is due to consider how to conclude energy and capacity procurements by March 2026.

"With energy demand growing rapidly, our government is stepping up by advancing our largest energy procurement in our history. Our 'all-of-the-above' energy resource approach will expand access to affordable electricity to families and businesses across Ontario while opposing the regressive carbon tax," noted Stephen Lecce, Minister of Energy and Electrification.

US nuclear and coal sites could house 200 GW of new nuclear

The USA could install 60-90 GW of new capacity at the sites of operating and retired nuclear power plants, according to a report from the Department of Energy's Office of Nuclear Energy.

The report, titled 'Evaluation of Nuclear Power Plant and Coal Power Plant Sites for New Nuclear Capacity', examined 54 operating and 11 retired nuclear power plants in 31 states. It used aerial analyses, utility plans and a siting analysis tool to consider factors such as the availability of cooling water, proximity to population centres and other risks. The authors said the licensing process for new nuclear reactors could be accelerated and the costs of new builds reduced where utilities have previously engaged with the Nuclear Regulatory Commission.

The report also evaluated the potential of building new nuclear plants near current and retired coal power plants. The evaluation of potential new nuclear capacity near 145 coal plants in 36 states revealed an additional 128-174 GW of power that might be added at such locations, where existing energy-related workforces and infrastructure would likely prove beneficial for new nuclear projects. The total potential power capacity ranged from 128 GW from 115 large, 1117 MW units, to 174 GW from 290 smaller 600 MWe units.

US offshore wind pipeline firms up and includes large floating wind plan

- Maryland project approved
- California confirms interim target

Janet Wood

Recent approvals for offshore wind projects and new stretch targets by US authorities have added nearly 10 GW to the project pipeline and made significant steps towards the administration's goal of 30 GW of offshore wind energy by 2030.

The US Department of the Interior recently announced approval of US Wind Inc's Maryland Offshore Wind Project, which could provide more than 2 GW of clean energy generation, after the Bureau of Ocean Energy Management (BOEM) issued its environmental approval for the project in July.

It is the tenth commercial-scale offshore wind project to get the go-ahead from the government and brings the total to 15 GW.

The project, developed by Baltimore-based US Wind, which is majority-owned by Italy's Renexia SpA, consists of three planned phases. Two of them, MarWin and Momentum Wind, of around 300 MW and 808 MW, respectively, have secured offshore renewable energy certificates from the state of Maryland. The development will involve the installation of up to 114 wind turbines and up to four offshore substation platforms. The lease area is located about 8.7 miles offshore of Maryland and Delaware.

Meanwhile on the west coast, California's Public Utilities Commission (CPUC) has finalised a decision to establish an initial target of 7.6 GW for offshore wind energy procurement, to align with the state's goal of deploying 25 GW of offshore wind by 2045. Projects to meet this target are expected to go into operation between 2031 and 2037 and will be floating wind farms, due to water depths off the California coast.

Offshore Wind California said the interim goal is crucial for building the supply chain and achieving economies of scale. Its decision follows the passage of AB-1373 in 2023, a legislative act that paved the way for large-scale clean energy procurement, including offshore wind projects.

This announcement closely follows the California Energy Commission's endorsement of a strategic offshore wind plan, which outlines essential actions such as upgrading port infrastructure and enhancing workforce training. A $10 billion climate bond measure, which allocates $475 million for port improvements, will be presented to voters as Proposition 4 in November.

This 7.6 GW offshore wind target is part of a larger plan which aims to procure a total of 10.6 GW of clean energy from emerging technologies. As well as offshore wind, the state Department of Water Resources wants to procure 1 GW each of geothermal, multi-day energy storage and long-duration energy storage.

Chile defends plan to cut revenues for small green power providers

Chile has played down plans to cut revenues for smaller renewable power operators after the plans sparked alarm in the US Chamber of Commerce and with power investors.

A draft bill from President Gabriel Boric's coalition would reduce revenues from plants rated below 9 MW – mostly solar – to help subsidise poorer consumers.

Rating agencies warned that some small power generators could become unprofitable if the government plan goes ahead. Chilean renewable energy groups said the proposal was "seriously flawed".

Luis Sabaté, Chief Executive of power generator Matrix Renewables, said his company would not be able to repay debt raised and added: "This has an effect on subsequent investment… we were willing to continue investing in Chile but that will just stop."

Finance Minister Mario Marcel told the *Financial Times*: "People should not overreact. It's reasonable for an investor to be concerned about the rules of the game… but to go from there to questioning our whole institutional set-up in electricity seems to me excessive and unnecessary."

Chile is pursuing cuts to corporation tax, while it develops a green hydrogen industry, increases lithium production and speeds up permits for new projects.

Indonesia progresses with 2060 net zero ambition

- Plans to retire 800 coal plant
- Diesel power plants to be converted into hybrid systems with renewable energy

Junior Isles

Indonesia plans to retire 800 coal fired power plants by 2060 as part of its commitment to achieving net zero emissions (NZE). These plants will be replaced by gas fired power stations and biomass energy sources.

Wiluyo Kusdwiharto, Director of Project Management and Renewable Energy at state utility company PLN, announced this strategy during the Plenary Session of the Indonesia International Sustainability Forum 2024 in Jakarta on September 5th.

"We have a clear roadmap for achieving zero emissions by 2060, which includes replacing 800 coal fired power plants with gas fired plants and implementing biomass programmes," Wiluyo said.

However, Wiluyo noted that achieving this target will require significant investment, estimated at $700 billion to $1 trillion. This funding will support the development of 423 GW of green electrification or renewable energy-based electricity.

To date, PLN has cancelled 13.3 GW of coal fired power plants originally planned under the 2019-2028 Power Supply Business Plan (RUPTL). Additionally, 1.2 GW of coal fired capacity has been scrapped through Power Purchase Agreements (PPAs), and 1.1 GW of coal plants have been replaced with renewable energy sources.

Wiluyo also highlighted PLN's 'De-Dieselization Program', which aims to replace diesel power plants (PLTD) with cleaner energy sources. This involves creating hybrid power plants across Indonesia, combining diesel with renewable energy sources such as solar photovoltaic (PV) panels and batteries.

"We have approximately 5000 diesel power plants across Indonesia, and we are converting them into hybrid systems with renewable energy. Through this programme, we have reduced cumulative emissions by around 3.7 million tons of CO_2," Wiluyo added.

Geothermal continues to be central to the country's efforts to cut carbon emissions. Last month Energy and Mineral Resources Minister Bahlil Lahadalia said the total value of investments in the geothermal sector of Indonesia in the last 10 years is projected at $8.7 billion.

Speaking during the opening of the 10th Indonesia International Geothermal Convention and Exhibition, Lahadalia pointed out that Indonesia has 24 GW of geothermal potential, accounting for about 40 per cent of the global geothermal reserves. He also noted that geothermal capacity in the country has reached 2.6 GW, the second-largest in the world, and pointed out that the technology has helped Indonesia reduce carbon emissions by 17.4 million tons annually.

Lahadalia said that currently, Indonesia's total power plant capacity has hit 93 GW, with new and renewable energy (NRE) contributing 15 per cent to the overall figure. He said the government has a target of increasing the NRE share in the national energy mix to 23 per cent by next year.

■ At the end of August PLN Indonesia Power (PLNIP) began commercial operation of the 780 MW Tambak Lorok Combined Cycle Power Plant Block 3 ("Tambak Lorok"), in Tanjung Mas, Central Java. The gas fired power plant, which features GE Vernova's advanced H-class gas turbine, can provide enough power for approximately 5 million Indonesian homes.

South Korea builds on domestic nuclear success

South Korea is looking to capitalise on its ability to build and commission nuclear plants on time and to budget. After beating Westinghouse of the US and France's EDF to become preferred bidder on a $17 billion project in the Czech Republic in July, state-run utility Korea Hydro & Nuclear Power (KHNP) is set to sign a contract early next year for two reactors in the central European country.

If completed, it will mark Korea's first major overseas nuclear power project in 15 years, since a consortium led by KHNP parent Kepco won a $20 billion contract in 2009 to build and operate four nuclear plants in the United Arab Emirates.

Whang Joo-ho, the President of KHNP, said the company was conducting a feasibility study for a nuclear power plant in the Netherlands and was in talks to build reactors in Finland and Sweden as it aims to export 10 more reactors globally by 2030. Kepco has also held early-stage discussions with British officials about building a new station on the island of Anglesey off the coast of Wales.

According to Kepco and the Ministry of Trade, Industry and Energy, Korea's construction cost for a nuclear power plant is estimated at $3571/kW as of 2021, much lower than $7931/kW for France and $5833/kW in the US.

"Korea is the only country which has built [reactors] on time, on budget," the country's Industry Minister Ahn Duk-geun said after the Czech deal was announced. KHNP was responsible for building the recently completed Barakah nuclear power plant in the United Arab Emirates, where Unit 4 began feeding power into the grid at the start of last month.

The announcement of the Czech deal came just ahead of news that the Korean government approved the construction of two new nuclear reactors on the country's east coast, the first such decision in eight years.

The Nuclear Safety Commission (NSSC) gave the go-ahead last month to state-owned Korea Hydro & Nuclear Power (KHNP), the country's sole nuclear power plant operator, to build two more reactors, 3 and 4, at the Shin Hanul plant, located in the town of Uljin, some 225 km southeast of Seoul.

It is the first such decision since the NSSC in 2016 authorised the construction of reactors 3 and 4 at the Saeul plant in Ulsan (300 km southeast of Seoul).

Korea has decided to start re-investing in nuclear as part of its net zero plan. Last month the Ministry of Environment and Ministry of Trade, Industry, and Energy approved the Environmental Impact Assessments (EIAs) for Hexicon's 1125 MW MunmuBaram floating offshore wind project being developed off the coast of Ulsan.

Once commissioned, MunmuBaram will play a crucial role in supporting South Korea's renewable energy target and providing clean energy to more than 700 000 households.

Australia accelerates energy storage effort

Australia is accelerating its roll-out and integration of renewables with recent announcements that will boost both hydrogen and battery storage.

In mdi-September the Australian government published its 2024 National Hydrogen Strategy aimed at positioning the country as a global renewable hydrogen leader. The new strategy is a thorough review of the country's 2019 hydrogen strategy.

The announcement followed news that Western Green Energy Hub Pty Ltd (WGEH) and the Korea Electric Power Corporation (Kepco) signed a new Collaboration Agreement to advance the WGEH project in the southeast of Western Australia.

Stage 1 of the WGEH project is expected to generate around 6 GW of hybrid wind and solar power, to produce up to 330 000t/a of zero emissions green hydrogen.

Hydrogen has great potential as a way of providing long term energy storage for variable wind and solar.

In the meantime, Australia continues to grow its short term storage capacity by implementing battery projects.

Last month Australian Federal Environment Minister Tanya Plibersek said that planning approval has been granted for the Birriwa solar and battery project, which is being developed by the Australian unit of Philippines-based energy company Acen Corp. in the New South Wales Central-West Orana region.

The project will comprise a 600 MW solar farm and a battery energy storage system of up to 600 MW with two hours of storage capacity.

"We know projects like this are vital to boosting renewables capacity and putting downward pressure on prices, but they are also great for local jobs and economies," she said.

Acen said it expects to start construction of the project in late 2026 or early 2027, with power generation anticipated in 2029.

September also saw the Australian government announce support for six large-scale batteries in Victoria and South Australia after a pilot tender for dispatchable capacity across the two states.

The six projects, representing 995 MW/3626 MWh of capacity, are being underwritten by the Capacity Investment Scheme. The batteries will run for up to four hours and will be in service from 2027.

Singapore targets renewable imports

Singapore has boosted its goal to import clean electricity from neighbouring nations as it pushes to curb reliance on natural gas.

The city-state now aims to import 6 GW of clean electricity by 2035, up 50 per cent from its initial plan, Singapore's Energy Market Authority (EMA) said in a statement.

"Given the encouraging progress of electricity imports projects, and to ensure adequate supply to meet our future energy needs given growing demand, Singapore will raise its ambition," the EMA said.

Singapore, which generates 95 percent of its electricity from natural gas, is aiming to decarbonise its power mix but faces limits on building solar and wind farms because of a lack of available space. Authorities aim instead to import electricity. Last month the country gave initial approval for two projects to import 1.4 GW of low-carbon power from Indonesia to Singapore; this is in addition to the 2 GW of capacity approved last year.

Observers say the average consumer will likely not face a marked increase in their electricity bills when Singapore begins its renewable energy imports over the next few years. They added that the clean power will mostly be purchased by companies looking to slash their emissions.

Seven companies will be importing around 3.4 GW of solar energy from Indonesia, five of which are expected to start commercial operations for their projects from 2028.

GB grid operator under pressure to open up market to batteries

- Aging IT systems 'skip' battery option in balancing market
- New government promises faster delivery across electricity infrastructure

Janet Wood

A coalition of battery storage developers has written an open letter to the UK government and the new National Energy System Operator (NESO), asking them to "recognise battery technology as critical to Britain's national energy infrastructure" and to fix technical problems that have stopped batteries being fully utilised in the Balancing Market.

Battery operators Zenobē, Eelpower, Harmony Energy and Field Energy say the system operator fails to call on batteries even when they are the cheapest and fastest solution to grid. They say the result is, "consumers paying more, clean renewable energy being wasted and fossil fuel generation used instead".

The system operator's Craig Dyke said: "We do still acknowledge we still have more work to do," blaming a range of factors including outdated IT and limitations in the transmission system.

The issue has added to the in-tray for Secretary of State Ed Miliband, who has to deliver the new government's aim to be a "clean energy superpower". A new 'Mission Control' has been set up to try to deliver on that aim and its Chief Executive Chris Stark said the body would use the UK's Covid vaccine task force as one model in trying to remove the barriers both to installing more renewable energy and to extending the electricity network, which would help the country make maximum use of renewable energy generation.

Since taking power in July the Labour government has removed a ban on onshore wind farms and it increased the budget available in this year's allocation round for price stabilisation schemes known as contracts for difference (CfDs). In 2023 an allocation round failed to attract bidders, because the 'strike price' available was regarded as too low to underwrite projects. But this year's auction (Allocation Round 6) secured 9.6 GW of new renewable energy capacity across 131 projects, including the world's largest floating offshore wind farm.

Recently RenewableUK put forward proposals to "future proof" the CfD regime. Chief Executive Dan McGrail said its five proposals, "outline practical steps to provide long-term assurance to developers and the supply chain, whilst building on returning investor confidence following this year's encouraging auction results.

He added: "Several of the proposals can be implemented without major legislative reform in time for the next auction round in 2025, reducing costs whilst ensuring we procure increasing levels of new renewable energy as we look towards 2030 and beyond on our journey to becoming a clean energy superpower."

Vattenfall pauses work on flagship Swedish offshore wind farm

Swedish energy company Vattenfall has halted plans to invest in offshore wind farms, starting with pausing development of the country's most mature project – Kriegers Flak – until further notice. The company was due to install up to 50 turbines in an area that borders Danish and German offshore wind farms but it said it is no longer possible to complete the project in 2028, as originally intended.

In a statement, Vattenfall described it as Sweden's "most mature offshore wind power project", but said "investment prerequisites for offshore wind in Sweden are currently not viable". The company added: "Vattenfall has therefore decided to pause all further development of the project."

The cost of the project is said to have increased because the company will bear the costs of connection to the onshore grid. Estimates from Swedish Wind Energy suggest it could be around 10-15 per cent of the total cost, and other experts put the cost even higher.

It was also suggested that a decision by the Swedish government to support new nuclear power with credit and price guarantees has affected the profitability of wind and solar projects, by driving down electricity prices.

The utility said if conditions were to improve "the project can be resumed", adding that it had previously said that "one of the main prerequisites for investing in the project is a reasonable connection point to the national grid offshore".

Italy claims success on CCS project

Italy's is claiming a major milestone on its Ravenna carbon capture and storage (CCS) project after installing proprietary carbon capture technology from Mitsubishi Heavy Industries (MHI).

The KM CDR Process will capture around 25 000 tonnes per year from Eni's Casalborsetti natural gas plant. The capture process is treating flue gas from a natural gas turbine that drives a turbo compressor. The facility claims it is reducing carbon emissions by 90 per cent, and that rises to peaks of 96 per cent, although the carbon dioxide concentration levels are less than 3 per cent and the atmospheric pressure in the exhaust is low level. It says the project could be replicated with other industrial processes producing low carbon dioxide flue gas.

The captured CO_2 is being transported through reconverted gas pipelines and injected and stored in Eni's depleted offshore gas field. Over the coming years, with Phase 2, the further industrial-scale development of the Ravenna CCS project aims to store up to 4 million tonnes of CO_2 per year by 2030.

Tatsuto Nagayasu, MHI's Senior Vice President (CCUS) of GX (Green Transformation) Solutions, said: "What MHI's carbon capture technology has achieved through this project marks a significant milestone and paves the way for further carbon emission reductions across the industry in the future. It also supports the ambitious CCUS goals set by Italy and Europe."

New French nuclear reactor starts up after 12-year delay

- Italy considers return to nuclear
- Czechia picks Rolls Royce for small units

Janet Wood

France has started up a new EPR-type nuclear reactor at Flamanville, 12 years after it was planned to start up. The reactor is expected to start supplying power to the grid in three months, when it reaches 25 per cent of its total power.

The new reactor will operate at full power in "several months", said Régis Clément, Deputy Director of EDF's nuclear production division

In February 2022, French President Emmanuel Macron announced plans to follow Flamanville with at least six new reactors, and possibly as many as 14.

The startup comes as France's nuclear company EDF highlighted increased production from its existing reactors, after several years of poor performance that have helped drive up prices in Europe. Shorter outages have been an aim of the company's action plan and this year 11 reactors have been reconnected to the grid ahead of schedule.

The good news from France's nuclear industry comes as Italy begins a national reconsideration of its non-nuclear policy. Italy's Environment Minister, Gilberto Pichetto Fratin, announced plans to introduce new regulations by the end of the year to allow the use of nuclear technologies in the country, aiming to have a new decree in place by 2025.

The measures would reverse a nuclear energy phase-out, which began after a referendum in 1987, followed by a similar ban in 2011.

Riccardo Zucconi, an Italian MP belonging to Prime Minister Giorgia Meloni's right-wing populist Brothers of Italy party, said global demand is expected to double in the next 10 years, and renewable energies alone are not enough.

"Alternative options, including a new generation of smaller plants, are emerging and should be seriously considered," he said, noting that Italy has expertise in the sector. According to the government's energy and climate plan (PNIEC) the use of new types of plants could meet up to 11 per cent of national energy demand by 2050.

Zucconi's interest in smaller nuclear stations echoes that within other European nations. Recently Rolls-Royce was named as being on course to secure the first order from a European government to build a fleet of mini nuclear reactors after being selected as the preferred supplier in a competition overseen by the Czech government.

The UK aerospace and defence group beat six other rivals to seal the agreement with state utility ČEZ Group, it said recently.

Chris Cholerton, Chief Executive of the company's small-modular reactor business, said the "landmark" partnership would put ČEZ, Rolls-Royce SMR and its existing shareholders "at the forefront" of SMR deployment.

Poland counts the cost of exiting coal

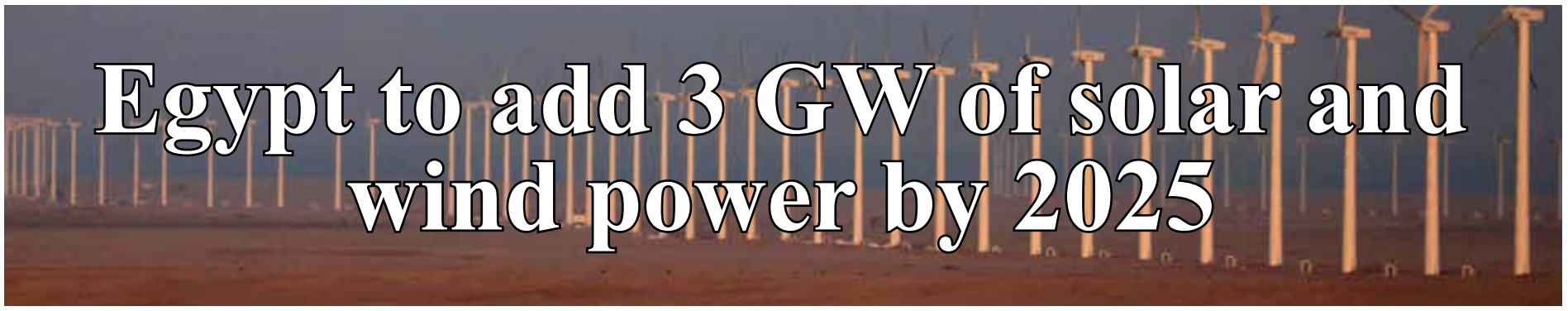
Poland will have to invest €177 billion by 2040 in its electricity system in its most ambitious transition scenario, said Climate Minister Katarzyna Pelczynska-Nalecz recenty.

She said: "For various reasons, the Polish economy is still very energy-intensive and our dependency on coal is still high… The share of coal in electricity production in Poland is at around 50 per cent." She added: "Implementing the goals set by the EU imposes a huge financial cost on our economy. The most ambitious scenario estimates overall investment in the electricity generation sector at around €72 billion by 2030 and €177 billion by 2040."

Pelczynska-Nalecz noted that the transformation is financed by national resources, state and local government funds, environmental funds and EU funds.

"In total, since Poland's accession to the EU, until the end of 2023 the value of EU funds or projects implemented under the cohesion policy amounted to almost €170 billion," she said. "We have allocated more than €20 billion from the European Regional Development Fund and the Cohesion Fund for environmental protection and energy transition," she added.

"Poland has been benefitting from the EU emissions trading scheme for 10 years and has received more than €25 billion from the sale of emission permits and only part of this has been used to finance the transition," she noted.



Egypt to add 3 GW of solar and wind power by 2025

- Private companies to build, own and operate projects
- EBRD loan to bolster electricity transmission network

Nadia Weekes

The Egyptian Ministry of Electricity and Energy is planning to enlist the help of private-sector companies to add 3 GW of solar and wind power to the national grid by 2025. The new plants are to be built under a build, own, operate (BOO) model.

The investors will finance, build, operate and own the projects, while the Egyptian Electricity Transmission Company (EETC) will purchase the electricity generated from these renewable energy projects during their entire lifespan, which is estimated at about 20 years for solar power and 25 years for wind power.

The projects include a 500 MW solar power plant by Norway's Scatec and a 1 GW solar project to be built in two phases by UAE-based AMEA Power.

A ministry official added that a 650 MW wind farm will be developed by a consortium of Orascom Construction, Japan's Toyota Tsusho and France's Engie. Another 200 MW wind farm is being developed by Saudi Arabia's ACWA Power.

About 600 MW of solar projects are to be implemented by various companies for a total investment in excess of $2.5 billion, the official said, noting that most are located in Ras Ghareb, near Hurghada, and in Aswan.

A Japanese consortium led by Mitsubishi has been selected to develop a €90 million ($100 million) 20 MW solar power plant in Hurghada. The consortium may partner with a local company to design, construct, operate and maintain the plant for two years.

The project was set to begin operations in mid-2019 but experienced delays related to a loan from the Japan International Cooperation Agency (JICA).

Final negotiations between the Egyptian government and the Japanese consortium are ongoing, with the final contract anticipated to be signed before the end of the year. The plant is projected to start operations in 2026.

Notably, the Hurghada solar station will be Egypt's first solar power plant equipped with battery energy storage.

In a related development, Egypt will use a €165 million sovereign loan from the European Bank for Reconstruction and Development (EBRD) to bolster the country's electricity transmission network.

The loan will support the upgrade of a crucial 500 kV substation in the Cairo governorate, which is directly linked to the completion of the Shoubra El Kheima gas fired power plant.

The funding will also be used to construct a 200 km high-voltage overhead transmission line to facilitate the transmission of approximately 2.1 GW of renewable energy from the Gulf of Suez region, where several wind energy projects are currently in development or construction.

UAE's Barakah nuclear plant fully commissioned

The Emirates Nuclear Energy Corporation (ENEC) has marked the full commissioning of the Barakah nuclear energy plant, as its fourth unit entered commercial operations.

The plant generates 40 TWh of electricity per year, representing up to 25 per cent of the country's electricity.

The construction of Barakah has created 2000 jobs and yielded $6.7 billion in local procurement.

"This source of clean electricity will act as a magnet, attracting additional investment in the UAE by sustainably minded but energy-intensive industries from around the globe," said Khaldoon Khalifa Al Mubarak, Chairman of ENEC's Board of Directors.

Meanwhile, plans to expand the UAE's gas fired power generation capacity by 5 GW have been unveiled as part of a broader strategy to balance the country's energy portfolio while leveraging existing fossil fuel resources.

The new gas fired power plants are expected to be developed in phases, with the first units coming online in 2027. Abu Dhabi National Energy Company (TAQA) and the Abu Dhabi National Oil Company (ADNOC) are poised to play a central role in this plan.

While the UAE is developing renewable energy projects and nuclear power, gas fired power remains a critical element of its energy strategy. The plan is to integrate carbon capture and storage (CCS) technologies to mitigate the environmental footprint of the new gas power plants.

Morocco eyes Atlantic offshore wind development

The European Investment Bank (EIB) has issued a tender notice for technical assistance to conduct a feasibility study in an area off Morocco's Atlantic coast for the country's first offshore wind project.

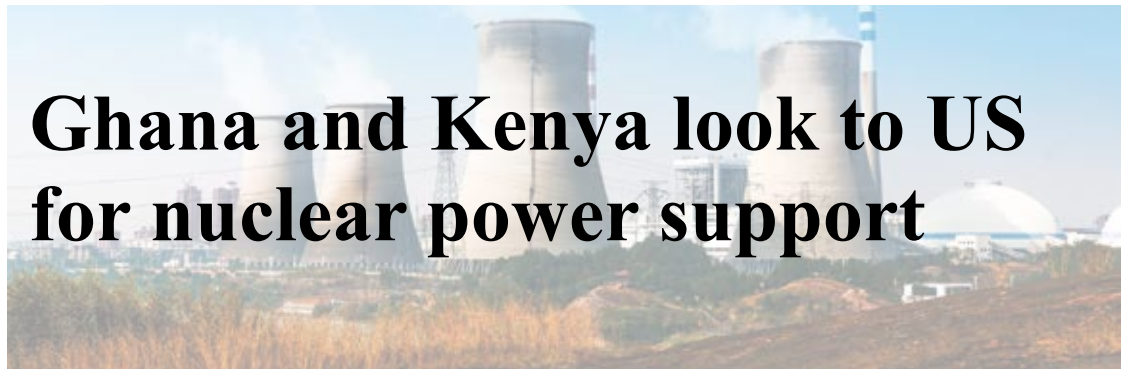
The notice relates to the relaunch of a procurement procedure cancelled in July.

According to the Moroccan Agency for Sustainable Energy (MASEN), Morocco has a high potential to exploit offshore wind, particularly along its Atlantic coast where the shallow waters are suitable for fixed-bottom turbines.

The agency plans to develop the first offshore wind project off the coast of Essaouira. It is seeking the support of a consultant to evaluate the feasibility of the project.

The two-year contract, valued at €2 million, covers a feasibility study, complementary studies, as well as an environmental and social impact assessment.

The World Bank Group estimates that Morocco has a technical offshore wind potential of 200 GW, of which nearly 90 per cent could only be tapped through floating wind technology.



Ghana and Kenya look to US for nuclear power support

- Cooperation agreement on landmark Ghana SMR
- Kenya in nuclear technology MOU with US

Nadia Weekes

Ghana is committed to adding nuclear power to its energy mix, Deputy Minister of Energy, Collins Adomako-Mensah, said as he addressed a US-Africa Nuclear Energy Summit in Kenya last month.

Adomako-Mensah described the signing of a cooperation agreement between Nuclear Power Ghana and Regnum Technology Group to build a project as a significant milestone in Ghana's nuclear agenda.

"This agreement aligns with Ghana's aim to establish itself as a small modular reactor (SMR) regional training hub and centre of excellence for sub-Saharan Africa, supporting the West African power pool and promoting clean, reliable energy," he said.

The project, which will use NuScale Power LLC technology, is designed to "lead the way on small nuclear-reactor deployments in the region" the US Department of Energy (DOE) said.

The US has championed nuclear technology for Africa's energy transition, touting reactors that it says can help the continent cut emissions while adding flexible generation capacity more quickly than large nuclear plants.

SMRs can be mass-produced for on-site assembly, reducing the time for construction and installation. Yet most are still in the design stage, and soaring inflation, coupled with rising interest rates, has driven up costs.

A previous US agreement with Ghana, which relies on gas for about half of its 6.6 GW generation capacity, established a regional training centre for SMR technology.

Ghana's Energy Transition Framework intends to achieve net zero by 2060 by deploying low-carbon technologies across all sectors. It expects nuclear energy to help reduce its reliance on fossil fuels, mitigate climate change and ensure energy security for future generations.

Nana Menya Ayensu, Special Assistant to the US President for Climate Policy, Finance and Innovation, expressed confidence in Africa's capability to embrace nuclear energy. South Africa is the only African country currently generating electricity from a nuclear power plant, while Egypt is setting up plants with a capacity of 4.4 GW.

Meanwhile, at the 2024 International Atomic Energy Agency (IAEA) general conference in Vienna in late September, Kenya signed a memorandum of understanding with the US on nuclear technology.

Areas of cooperation will include sharing of operating and regulatory experience, and joint programmes of nuclear safety research and training.

Kenya plans to add nuclear power to its energy mix by 2035, as part of a broader strategy to meet its growing energy demand.

The Director General of the Kenya Nuclear Regulatory Authority (KNRA), James Keter, said this was a critical juncture for Kenya. "We will work with industry leaders and every stakeholder to fortify our regulatory framework to ensure the responsible and effective development of our nuclear programme," he said.

DTEK to build 200 MW of energy storage in Ukraine

DTEK Group is to invest €140 million to build 200 MW of energy storage capacity in Ukraine for commissioning by September 2025.

The systems will provide ancillary services to Ukraine's transmission system operator (TSO) Ukrenergo.

The agreement involves a number of assets, geographically distributed across the country.

DTEK Group is one of several industry players that won the right to provide ancillary services – namely automatic frequency restoration reserves – to Ukrenergo in a competitive auction on 22 August.

Energy storage systems are a strategic priority for DTEK Group, which is building Poland's first large electricity storage project as part of efforts to create a pan-European energy system that unites Ukraine and the EU.

Announcing the project, DTEK CEO Maxim Timchenko said that, despite the war and limited access to international capital markets, his company was continuing to invest in Ukraine to both restore destroyed infrastructure and build new facilities.

"Our priority remains unchanged: to develop green energy in Ukraine, accelerate the integration of the country's energy system into Europe and to strengthen our country's energy security," he added.

Battery technology is vital in making possible the decentralisation of Ukraine's energy system by accumulating energy when generation surges and releasing it when it is needed.

Middle East companies target Spain and Portugal clean energy assets

- Masdar to buy renewables group from Brookfield
- Qatar Investment Authority considers increasing stake in Iberdrola

Junior Isles

Renewable assets in Spain and Portugal are proving attractive to Middle East investors.

Last month Abu Dhabi state-backed clean energy company Masdar said it will buy Spanish renewables group Saeta Yield from Brookfield at a $1.4 billion valuation, its second investment in the country's green energy sector this year.

The deal is mostly for wind farms, as well as solar plants, in Spain and Portugal, with an operating capacity of 745 MW and a further 1.6 GW planned for development.

Masdar will invest Dh2.88 billion ($780 million) to acquire Saeta from Brookfield's renewables unit. The Abu Dhabi group is chasing an ambitious target, set in 2022, of owning at least 100 GW of renewable energy capacity by 2030. With six years to go, its capacity is now more than 20 GW, not including assets bought this year because some deals have not yet completed.

It comes less than three months after Masdar agreed to invest €817 million in Spanish solar power plants belonging to Endesa, a subsidiary of Italian energy group Enel.

"This deal consolidates our footprint in the Iberian market," said Masdar Chief Executive Mohamed Jameel Al Ramahi.

Both of the deals require foreign investment approval from authorities in Spain and Portugal.

Following the announcement Qatar Investment Authority, the nation's sovereign wealth fund, controlling an estimated $475 billion (QR1.73 billion) of assets, said it is considering increasing its stake in Spain's leading utility company, Iberdrola.

The authority wants to increase its 8.8 per cent stake in Iberdrola, a multinational electricity provider, to a share above 10 per cent, according to local Spanish media reports.

The 8.8 per cent stake, reported by LSEG (London Stock Exchange Group) data, makes Qatar Iberdrola's largest shareholder ahead of Blackrock (5.395 per cent) and Norges (3.115 per cent).

The authority has stated that discussions with the Spanish government about increasing its stake in Iberdrola had taken place.

The sector appeals to energy companies and also to institutional investors and private equity groups because of the promise of steady returns from power purchase deals, and the prospect of reselling assets at a higher price further into the future.

However, renewables projects are not as profitable as they once were, which has led to several recent asset disposals.

At the end of August Norwegian oil major Equinor said it was abandoning plans to develop offshore wind in Spain and Portugal.

Equinor entered early into the floating offshore wind market in Spain. In 2022, the company partnered with Spanish utility Naturgy Energy Group SA to prepare for Spain's floating wind auction with a 200 MW project off the Canary Islands. The Spanish government has set a target of 3 GW of installed offshore wind by 2030.

Meanwhile, Portugal launched the initial phase of the first offshore wind auction at the end of October 2023 by issuing the call for expressions of interest. In January 2023, the country's Ministry of Economy and Maritime Affairs, the Ministry of Infrastructure, and the Ministry of Environment and Climate Action released draft areas for offshore wind development as part of the government's plan to award 10 GW of capacity by 2030.

The government proposed putting the areas out to tender in phases, with three areas totalling 3.5 GW to be offered in the first phase.

Speaking to *Reuters*, Equinor's head of renewables, Paal Eitrheim, said that "it's getting more and more expensive, and we think things are going to take more time in quite a few markets around the world". He added that the company may also consider exiting other markets.

Topsøe delivers solid financial results for first half-year 2024

Topsøe a global leader in carbon emission reduction technologies, has reported favourable financial results for the first half of 2024.

The company said revenue and earnings "remain solid and are supported by strong margins".

Revenue for the first six months was DKK4150 million ($621 million) compared to DKK4664 million in the same period 2023. EBIT before special items was 7 per cent higher at DKK 503 million (DKK472 million in 2023) as a result of higher gross margins and a strong focus on operating costs.

Almost one fifth (19 per cent) of revenue, around DKK800 million, came from business related to technologies and solutions that enable the energy transition.

The results come off the back of a first half-year where the business environment was affected by inflation, high interest rates and a general slowdown in Europe.

The company said delays in finalising regulatory guidance, cost increases for CAPEX projects and high interest rates have led to a low conversion of announced projects to final investment decision (FID). Clear, consistent and impactful policies and regulations are urgently needed for more energy transition projects to reach FID, said the company.

Despite the current market conditions, Topsøe continues to see a strong demand for its technologies and solutions within renewable and low-carbon fuels.

Further, it said the award of a more than $135 million US tax credit allocation under section 48C of the Inflation Reduction Act (IRA) is "a resounding recognition" of its Solid Oxide Electrolyser Cell (SOEC) technology. The allocation will support construction of an SOEC factory in the US Pending FID, the manufacturing facility will be built in Chesterfield, Virginia and further supported by a $6 million grant from the Commonwealth Opportunity Fund.

Adani Group invests in green energy push

The Adani Group has pledged to invest more than $48 billion by 2030 to expand its green energy business spread across renewable energy generation, as well as increasing its manufacturing footprint for electrolysers.

The power-to-ports conglomerate will infuse the capital in its two companies – Adani Green Energy (AGEL) and Adani New Industries, in line with the company's pledge shared with the Ministry of New & Renewable Energy (MNRE) at the Global Renewable Energy Investors Meet & Expo (RE-Invest 2024) last month.

"AGEL will increase its RE capacity to 50 GW from 11.2 GW by the end of this decade. Adani New Energy will expand solar manufacturing capacity to 10 GW from 4 GW at present," said one source.

The group will increase wind turbine manufacturing capacity to 5 GW from 1.5 GW currently, while electrolyser manufacturing capacity will be raised to 5 GW by 2023, the source added.

The news came as Adani Green Energy struck a new deal with French oil and gas major TotalEnergies. The deal will see Total invest $444 million in a joint portfolio of solar power projects.

Total is one of the non-Indian companies that has pursued collaborations with the Adani Group since the conglomerate faced corporate fraud allegations last year from Hindenburg Research. The Indian group has strenuously refuted the claims.

Total said it was forging a new joint venture with Adani Green Energy Limited, an Adani subsidiary in which it already has a 19.75 per cent stake. The two sides will hold 50 per cent each of a 1.15 GW portfolio of solar parks in the Gujarat region, enough to power a small city. AGEL will contribute assets and Total will provide funding for the JV's development.

"This will strengthen TotalEnergies' strategic alliance with AGEL, allowing it to support the company in becoming a global renewable leader as it targets 50 GW of renewable power capacity by 2030," the French company said.

The deal follows a separate $300 million investment by Total in another solar and wind venture with AGEL in September last year, several months after the French group initially paused deals with the Indian group when the allegations surfaced.

BP puts US onshore wind business up for sale

International oil and gas major BP has put bp Wind Energy, its onshore wind business in the US, up for sale in a move to trim its renewables business and sell-off underperforming assets.

The company plans to sell the nine wind farms it owns outright and its share in a tenth in Hawaii in order to focus on Lightsource bp, the solar energy business it is in the process of buying. The wind farms, spread across seven states, are all operational and have a combined capacity of 1.7 GW, of which BP owns 1.3 GW. Analysts at RBC Capital Markets said they could be worth upwards of $2 billion.

BP also wrote-down the value of its offshore US wind business by $1.1billion last year after struggling to make progress on three projects on the east coast. The new head of the gas and low carbon division William Lin said that BP's onshore wind business was "not aligned with our plans for growth in Lightsource bp" and that the company would continue "to simplify our portfolio and focus on value".

"Ultimately, offshore wind in the US is fundamentally broken," said the company's former renewables chief Anja-Isabel Dotzenrath last November. She left BP in April.

The US is widely expected to miss its 30 GW offshore wind target for 2030 after high interest rates and supply chain snarl-ups forced developers to cancel roughly a third of previously planned projects.

President Joe Biden's landmark Inflation Reduction Act offers lucrative 10-year tax credits to lower the cost of wind deployment and attract local manufacturing. Nevertheless, wind installations on land have slowed, falling 26 per cent in 2023 compared with 2022.

Americas

Wärtsilä to supply new Kentucky power plant

Wärtsilä will supply the engineering and equipment for a new power plant project to be installed in Madisonville, Kentucky, USA. The order was placed by Kentucky Municipal Energy Agency (KYMEA).

The 75 MW KYMEA Energy Center I will operate with four Wärtsilä 50SG engines running on natural gas. The engines have fast start and stop features and will provide flexible and rapid response to fluctuations in the availability of wind and solar power, enabling the power plant to provide grid balancing capabilities.

The Energy Centre is expected to be fully operational in spring 2027.

KYMEA serves the current and future electric power and energy requirements of eleven Kentucky municipalities.

Advancing world's largest low-carbon H_2 project

Mitsubishi and Exxon Mobil have signed a Project Framework Agreement for Mitsubishi's participation in ExxonMobil's facility in Baytown, Texas which is expected to produce virtually carbon-free hydrogen with approximately 98 per cent of CO_2 removed, and low-carbon ammonia.

Under the terms of the agreement, the companies will advance discussions regarding Mitsubishi's offtake of low-carbon ammonia and equity participation in the project. The ammonia is expected to be used in Japan for power generation, process heating, as well as other industrial activities.

The facility is expected to be the world's largest of its kind upon startup, capable of producing up to 1 billion cubic feet (bcf) daily of low-carbon hydrogen and more than 1 million tons of low-carbon ammonia per year. A final investment decision is expected in 2025 with anticipated startup in 2029.

Empire Wind 1 turbines ordered from Vestas

Equinor has ordered 54 of Vestas' 15 MW turbines for the 810 MW Empire Wind 1 offshore wind project in New York. This is Vestas' first order for an offshore platform and its V236-15.0 MW turbine in the USA.

Vestas will supply, deliver, and commission the turbines, and service them under a five-year agreement, with a long-term service support agreement going into effect after that.

Turbine delivery is expected to begin in 2026 with completion scheduled for 2027.

Wood wins BC Hydro modernisation contract

Wood has won a contract from BC Hydro to modernise and expand the electric grid in British Columbia, Canada, to meet the province's 2030 emission reduction targets.

Under the $200 million, seven-year master services agreement, Wood will provide EPCM services to modernise power lines, substations and transmission and distribution lines. The modifications are intended to provide cleaner and more reliable energy to communities across the province.

In January 2024, BC Hydro outlined its investment plans to sustain and expand the electricity system to ensure it is fit for the future. BC Hydro currently provides power to 95 per cent of the population of British Columbia, with 98 per cent of this power coming from clean renewable sources.

Asia-Pacific

India opens 500 MW offshore wind tender

The Solar Energy Corporation of India (SECI), a company of the Ministry of New and Renewable Energy (MNRE), has launched a tender for the development of a 500 MW offshore wind project off the coast of Gujarat, India.

According to the tender documents, bids must be submitted by 12 December, and pre-bid meetings are scheduled for 22 October.

SECI is seeking proposals to establish a BOO 500 MW offshore wind project. The successful bidder will enter into a PPA with SECI for 25 years. Renewable energy procured by SECI will be sold to Gujarat Urja Vikas Nigam Limited.

The project will be built in an area of 202 km^2 in the Gulf of Khambhat off the coast of Gujarat. The wind farm should be designed for interconnection with the Inter-State Transmission System (ISTS).

The project has a completion deadline of 48 months.

Suzlon wins India's largest wind turbine order

Suzlon has won the largest wind energy order in India's history from NTPC Green Energy. The order is for 1166 MW, and Suzlon will install 370 S144 wind turbine generators, each with a rated capacity of 3.15 MW.

These turbines will be equipped with Hybrid Lattice Tubular towers and will be deployed across two projects managed by NTPC Renewable Energy, a wholly-owned subsidiary of NTPC Green Energy Ltd (NGEL), and one project managed by IndianOil NTPC Green Energy, a group company of NGEL. All the projects are located in Gujarat.

MAN to build three gas engine plants in SE Asia

MAN Energy Systems has won orders for a total of 16 gas engines with a total capacity of 172 MW to supply electricity to the Indonesian grid and power an LNG terminal in Borneo, Malaysia.

MAN will supply five 20V35/44G gas engines with a total capacity of 52 MW as gensets for a new power plant in Batam, Indonesia. It will also supply four 20V35/44G TS gensets with two-stage turbocharging with a total capacity of 50 MW to be installed at a power plant in Cikarang, a suburb of the Indonesian capital Jakarta. Both power plants will run on low-emission natural gas and feed electrical energy into the Indonesian power grid.

MAN will also supply seven 20V35/44G gas engines with a total capacity of 70 MW to drive a decentralised power plant in Sipitang located in Sabah, East Malaysia. The power plant will run on natural gas and become the sole supply of electricity to a nearshore FLNG terminal that is currently under construction and expected to be in commercial operation by year 2027.

Europe

UKA orders Nordex wind turbines

UKA has ordered 10 wind turbines from Nordex for the 68 MW Mahlsdorf wind farm in Brandenburg, Germany. The turbines will be from the Delta4000 series N175/6.X. The order also includes a 20-year service agreement for maintenance of the turbines.

After installation and commissioning in 2025, the UKA wind farm Mahlsdorf will be the first wind farm with N175/6.X turbines with hub heights of 179 m in Germany. The hybrid towers used in this project were developed in-house by the Nordex Group. Due to the large hub height, good wind speeds can be achieved even at typical light-wind locations.

Deutsche Windtechnik to maintain Vestas turbines

Deutsche Windtechnik Sweden has signed a full-maintenance contract with Wallenstam to service 23 Vestas V90 wind turbines for 30 years, exceeding the average operational life of 20 years. The turbines are spread across nine different wind farms in southern Sweden.

Patrik Persson, Energy Manager at Wallenstam, said: "The contract ensures the reliable operation of our wind farm well beyond the average lifespan, which fully sustains our portfolio with renewable energy and a surplus fed into the Swedish power grid."

GE Vernova signs repower agreement with IVPC

GE Vernova has been selected by IVPC Group to repower five wind turbines at its Montefalcone wind farm in Italy.

As part of this repowering project, GE Vernova will provide five units of its 6.1 MW-158 m onshore wind turbine. The deal includes a service agreement where IVPC Group will lead the performance of maintenance work with engineering support from GE Vernova.

Delivery is scheduled to start in early 2025, with the project completed by the end of 2025.

This project is the first use of GE Vernova's 6.1 MW-158 m onshore wind turbine, which has two-piece blade technology.

AFRY to support upgrade of Italian solar plants

ContourGlobal has selected AFRY to provide owner's engineering services for the upgrading and repowering of 35 solar power plants located throughout Italy. This will increase the efficiency of these plants, representing around half the company's portfolio in Italy. The plants are situated in nine different regions and have a current installed capacity of 60 MW.

AFRY's role will include review of project plans and permits, detailed examination of project documentation and necessary authorisations, site visits and inspections of materials, monitoring and supervision of the construction process and final checks and supervision during the commissioning phase.

Paola Agrati, CEO of ContourGlobal Italy, said: "We are continuously committed to improving the performance of our assets, and through this repowering and revamping project, we will significantly increase the installed capacity and efficiency of our solar PV portfolio in Italy."

International

AMEA Power to develop largest African solar plant

AMEA Power has been awarded two new landmark renewable energy projects in Egypt. The first project is a new 1000 MW solar PV power plant with a 600 MWh BESS in the Benban area, Aswan Governorate. The second project is a 300 MWh BESS, an expansion of the company's existing 500 MW Abydos solar power plant currently under construction in Kom Ombo, Aswan Governorate. The project will mark the first-ever use of a utility-scale BESS solution in Egypt.

AMEA power has signed PPAs with the Egyptian Electricity Transmission Company for both projects. These projects have a combined investment of $800 million.

Mott MacDonald JV to design Borumba dam

Mott MacDonald, in partnership with GHD and Stantec under the Water2Wire joint venture, has been selected by Queensland Hydro as the dam's designer delivery partner for the 2000 MW Borumba Pumped Hydro Project. The project will have a capacity of 48 000 MWh.

Water2Wire JV will be responsible for leading the engineering and design for the project's seven proposed dams: six new dams to form a new upper reservoir, and one new dam wall and spillway immediately downstream from the existing Borumba Dam. The dam wall will see Lake Borumba increase its capacity providing security to the proposed energy storage scheme.

Kieran Cusack, CEO of Queensland Hydro, said: "Water2Wire has consistently demonstrated their expertise in delivering world-class hydropower and dam projects. The three companies of the joint venture will bring their significant dams and hydro design experience to our Borumba Project."

GE Vernova to supply Queensland with BESS

Quinbrook Infrastructure Partners has selected GE Vernova to provide the Battery Energy Storage System (BESS) for the second stage of its Supernode BESS project in Queensland, Australia. This phase comprises 250 MW/1000 MWh of energy storage.

Construction of this battery storage system is the second stage of a proposed three-stage project. In early 2024, GE Vernova was also awarded the contract for BESS integration for Stage 1 of the project comprising 250 MW/500 MWh, which is already underway.

Quinsbrook's Supernode project involves creating a BESS and data centre complex in Queensland. Once complete, the 750 MW (2-4 hr) BESS site is expected to be one of the largest battery storage installations in the Australian national electricity market.

Landmark gas turbine order in Saudi Arabia

Mitsubishi Power has received an order from Samsung C&T Corporation Saudi Arabia to provide its M501JAC CCGT hydrogen-ready gas turbine for a new industrial steam and electricity cogeneration plant project in Saudi Arabia developed by a consortium led by Abu Dhabi National Energy Company (TAQA) and JERA. The new plant will produce electricity and steam for a petrochemical complex located in Jubail in the Eastern Province of Saudi Arabia.

The 475 MW cogeneration power plant will be developed by a special purpose entity owned by TAQA (51 per cent) and JERA (49 per cent) and it will power the Saudi Aramco Total Refining and Petrochemical Company (SATORP) Strategic Expansion.

In addition, Mitsubishi Power signed a long-term service agreement with the TAQA and JERA-led consortium.

Gas

Europe gas market poised for uncertainty as role of Ukraine and LNG in question

Those European Union countries that continue to use Russian gas may see a supply cut-off this winter if Ukraine cancels a transit contract with Moscow. Furthermore, LNG supplies may become an expensive issue for the EU if winter is harsh, despite huge stores of gas now and talk that LNG demand may be in decline.

Gary Lakes

The gas market is always volatile and even more so now that the war in Ukraine will likely see the start of its third year before the coming winter is over. Demand and supply forecasts are numerous and often contradictory and depend on the factors given consideration. There are reports that energy demand is growing in Europe and others that say demand has fallen. Storage facilities are full, yet they might not last the winter. Demand for LNG is on the rise, yet there is a warning that too many import terminals risk being built.

The direction that gas demand and prices may go this coming year could depend on what happens between Ukraine and Russia and the transit of Russian gas through Ukraine to EU member states. As much as they may not wish to – or even might want to – several Eastern and Central European countries rely on natural gas supplies from Russia to balance out demand.

EU members – Austria, Hungary, Slovakia (and non-EU Serbia) – continue to receive Russian gas through the pipeline system that runs through Ukraine from Russia's gas fields. Despite a ban on Russian gas imports by pipeline imposed by Brussels in the early days of the Ukraine-Russia war, those states secured an exemption so they could continue to receive supplies because what were they going to do otherwise?

Aware that the EU was much too dependent on Russia for gas supplies well before the start of the war, the EU has in recent years supported projects designed to connect the existing gas networks in the EU, especially those in Eastern Europe, and build new pipelines where necessary, so there would be security of supply for EU members. Many of those projects are near complete, or at least the trans-shipment of gas through Europe is more improved than what it was in the mid-2010s. And with climate change being the global threat that it is, the EU has also backed and encouraged its members to build renewable energy projects to generate electricity. This in itself has impacted European power production.

Ukraine is expected to allow a transit deal that enables Russian gas to pass through its territory to expire at the end of the year, when the agreement with Russia comes due for renewal. Prior to the war, Russia supplied 40 per cent of Europe's gas, that percentage is now down to 15 per cent. Estimates of the volume that will pass through Ukraine during 2024 is put at 14 bcm.

The EU continues to permit shipments of Russian LNG to enter its market, but an unconfirmed report is saying that the Baltic States and Poland are urging the EU to ban imports of Russian LNG, so as to force EU buyers to find other sources. Considering some forecasts on future gas demand, this may not be the time to do it.

Furthermore, the US has imposed sanctions on seven LNG carriers that are connected to Russia's new Arctic LNG 2 facility, which is already under US sanction. The move is part of the US effort to restrict Russia's influence in global energy markets. The US is apparently intending for any gap that appears in the global LNG market caused by a lack of Russian LNG to be filled by that produced in the US.

Considering the state of the war, Kyiv is loath to cooperate with Moscow on this issue, even though it may bring some inconvenience to EU members. Bloomberg reported in September that an end to the transit accord is almost inevitable, but that the "region's stockpiles are brimming and efforts to source alternative supplies continue".

But if a transit agreement is not reached and Russian piped gas is not available, it could have a big impact on the market. If a harsh winter hits Europe, it could compel EU states to deplete their gas storage and turn attention to the spot LNG market where competition could be fierce, according to the report by Bloomberg.

But a recent report published by Emerging Europe suggested that Europe's demand for LNG may be in decline. Energy prices are stabilising and European gas consumption is decreasing, the report said, adding that "LNG terminals risk becoming costly, stranded assets".

European states rushed to build LNG terminals in the wake of Russia's February 2022 invasion of Ukraine, especially in Eastern and Central Europe which were highly dependent on Russian gas. This drove infrastructure investments in places like Poland and Lithuania and the drive to interconnect pipeline systems – all to meet demand in the wake of the Russian supply cut-off.

Citing a recently released report by the Institute for Energy Economics and Financial Analysis (IEEFA), Emerging Europe said the ambitious buildout of LNG infrastructure might now lead to a new challenge: under-utilisation.

According to IEEFA, total LNG imports to Europe declined by 20 per cent year-on-year in the first half of 2024. EU LNG imports fell by 11 per cent in the first half of 2024 compared to the same period for 2023. (The IEEFA includes the EU, the UK, Norway and Turkey in the term 'Europe').

Consumption, on the other hand, fell to a 10-year low in 2023, according to IEEFA, and Europe's gas consumption fell by 5.4 per cent year-on-year during the first half of 2024. EU gas consumption dropped by 3 per cent. The IEEFA forecasts that Europe's demand for gas will drop by a further 37 per cent by 2030.

Yet, it noted, a number of European countries continue to plan investment in new LNG terminals. This could mean that more than 300 billion m^3 (bcm) of unused capacity could exist in Europe by 2030, the institute said, because gas demand will be lower than the planned capacity.

Oilprice.com also cited the IEEFA as forecasting that LNG demand is expected to fall by 11.2 per cent in 2024 to 148 bcm "meaning the continent has likely already passed peak LNG consumption." LNG demand in Europe is further expected to drop to 93 bcm in 2030, IEEFA said.

As the global energy landscape shifts towards renewables and efficiency improvements, the IEEFA report said, questions are emerging about the long-term viability of LNG terminals in a rapidly decarbonising Europe.

Meanwhile, *CBC Canada* reported that a German diplomat has been in Ottawa and warned Canada against ramping up natural gas exports to Europe. "All studies show that the market is going to shrink. Germany will be driving forward on renewables, and gas demand will decline," the agency quoted Jennifer Lee Morgan, Germany's state secretary and special envoy for international climate action as telling Canadian officials.

Germany is Europe's biggest economy and largest emitter of greenhouse gases. She said that Germany intends to achieve net zero by 2045 and added that the role that natural gas plays in the German economy is set to diminish.

She cited studies and projections showing that Germany is expected to reduce its gas imports by 30 per cent by 2030 and 96 per cent by 2050. She said Europe is also expected to reduce natural gas imports by about 25 per cent by the end of this decade, *CBC Canada* reported.

But beyond Europe, the International Gas Union (IGU), Snam and Rystad Energy have warned of a supply shortfall unless adequate investment is made in the industry. In the 2024 Global gas report (GGR), which is entitled 'Rising Energy Demand in All Regions and Underinvestment in Gas and Clean Energy Jeopardise Global Energy Supply, with 2030 Energy Targets Visibly Out of Reach', the GGR partners say there is a limited gas supply and demand is rising steadily.

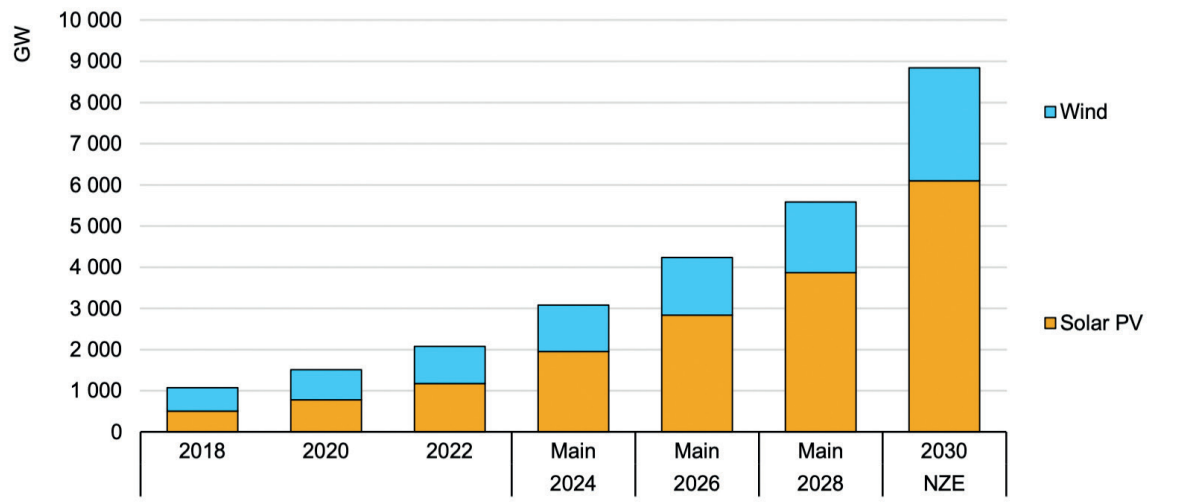
There are indeed regions of the world where natural gas demand is expected to rise significantly and the GGR is speaking to those regions, particularly Asia, but Europe appears to be on a different track.

"Global gas markets stay in fragile equilibrium, with limited supply growth as demand rises steadily, up by 1.5 per cent in 2023, with an expected acceleration to 2.1 per cent by the end of 2024," a statement in the GGR press release said. "Asia continues to be the key engine of this growth, while North America and the Middle East are in the lead on the exports."

"Should gas demand continue to grow as in the last four years, without additional production development, a 22 per cent global supply shortfall is expected by 2030. If demand continues to strengthen, the shortfall will be more pronounced," the statement said. "This underscores the urgent need to scale up investments," it added, in sharp contrast to picture that forecasters are painting for Europe.

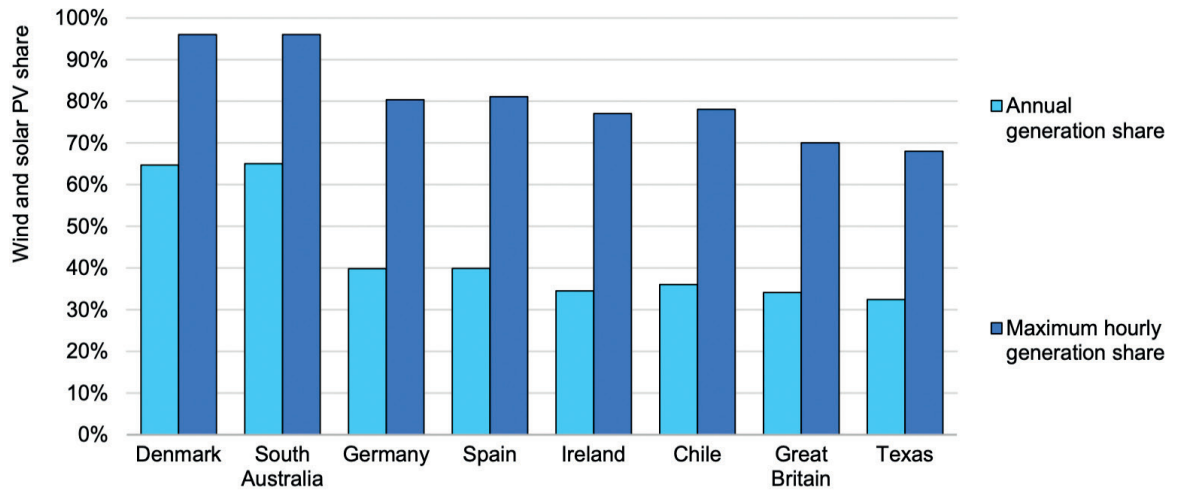
The EU continues to permit shipments of Russian LNG but LNG demand in Europe is further expected to drop to 93 bcm in 2030

Historical and future cumulative solar PV and wind power capacity in the Renewables 2023 main case (2024-2028) and Net Zero by 2050 Scenario, 2018-2030



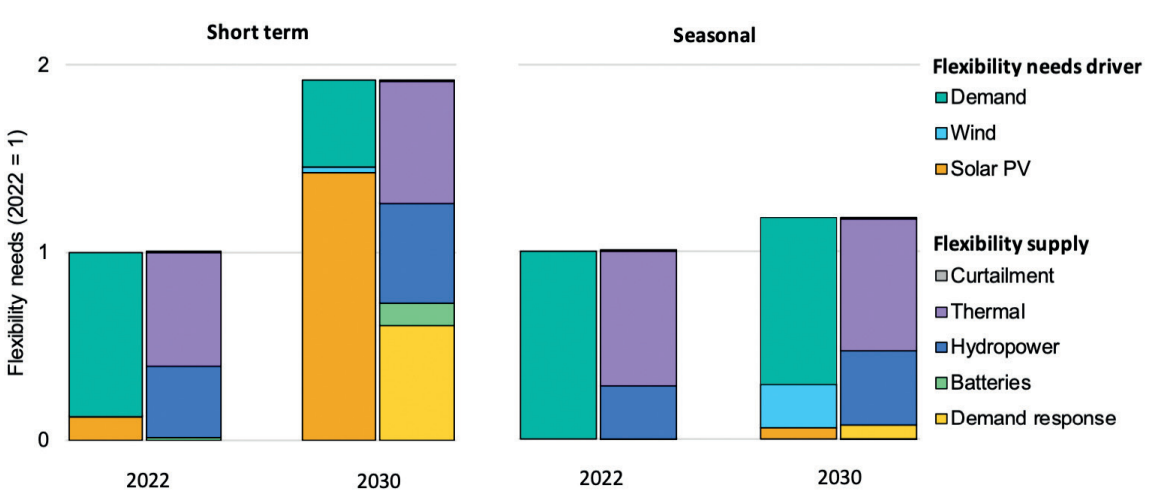
Notes: Main = Renewables 2023 main case; NZE = Net Zero Emissions by 2050 Scenario.
Sources: IEA (2024), Renewables 2023; IEA (2023), World Energy Outlook 2023.

Annual and maximum hourly solar PV and wind generation shares, selected countries and systems, 2023



Sources: IEA (2024), World Energy Statistics; hourly data collected using the IEA's Real-Time Electricity Tracker.

Global power system flexibility needs and supply in the Announced Pledges Scenario, 2022-2030



Notes: Flexibility needs are computed for 2030 taking into account changes in electricity supply and demand and weather variability over 30 historical years. Demand response includes the flexible operation of electrolysers. The figure represents the global average and therefore does not include the contribution of imports or exports. Short-term flexibility is calculated based on hourly changes in net demand (i.e. total demand minus wind and solar PV generation) within a day, and seasonal flexibility based on weekly changes in net demand within a year. More details on the calculation methodology can be found in IEA (2024), Managing the Seasonal Variability of Electricity Demand and Supply.
Source: IEA (2023), World Energy Outlook 2023.

For more information, please contact:

IEA Publications
International Energy Agency

Website: www.iea.org

Contact information:
www.iea.org/contact

Source: *Integrating Solar and Wind: Global experience and emerging challenges, https://www.iea.org/reports/integrating-solar-and-wind, CC BY 4.0*

Facing the cost headwinds in floating offshore wind

© Artist's impression of the Gazelle Wind Power deep water platform

Offshore wind is a vast, untapped resource for clean energy that humanity has hardly scratched the surface of in trying to capture and utilise. Part of the complication has been getting massive wind turbines out to sea cost-effectively. Floating platform technology that would support the largest turbines is part of a larger puzzle that includes making sure that wind farms can be developed at a similar cost to offshore wind farms with fixed-bottom foundations. Gazelle Wind Power's **Alvaro Ortega** explains.

Ortega: Many floating platforms today were developed for the oil and gas industry or optimised based on those legacy designs over a long period of time

It's well known that winds are stronger and more consistent in deep-sea waters compared to onshore or nearshore environments. This makes offshore wind a vast, untapped resource for clean energy that humanity has hardly scratched the surface of in trying to capture and utilise. Part of the complication has been getting massive wind turbines, sometimes as tall as the Eiffel Tower, out to sea cost-effectively. Getting turbines onto fixed-bottom platforms is already challenging enough, but even more so when turbines are placed on floating platforms and subjected to the forces of the wind, waves, tides, and currents.

Floating platform technology that would support the largest turbines (up to 15 MW) is part of a larger puzzle that includes making sure that wind farms can be developed at a similar cost to offshore wind farms with fixed-bottom foundations or even onshore wind farms. Conservative potential market estimates project over 300 GW of floating offshore wind capacity by 2050, the amount needed to reduce carbon emissions levels and stay on track with the agreed-upon 1.5°C above pre-industrial global surface temperatures. This would account for almost 15 per cent of all projected offshore wind production. However, floating offshore wind faces several obstacles hindering its development, particularly related to cost.

According to the National Renewable Energy Laboratory (NREL), the Levelised Cost of Electricity (LCOE – or the average cost of electricity generation for a given generator over its lifetime – for a floating offshore wind farm is estimated at $145/MWh, significantly higher than the $95/MWh for fixed-bottom offshore wind farms. This cost disparity has been the biggest barrier to floating offshore wind projects achieving widespread adoption and commercial viability.

Achieving the next phase of wind power by deploying floating offshore wind platforms farther into the sea requires lowering the high initial capital expenditures and operational costs associated with its technology. Developers must embrace innovation in design and construction, strategic financial planning, and efficient operational procedures and practices.

Some capital and operational expenditures are out of floating wind technology developers' control, such as interest rates and the costs of materials like steel, concrete, or copper. Those materials are used in the substructure and foundation, or floating platform, which accounts for approximately 30 per cent of the total LCOE, according to NREL. Therefore, technologists should look to use fewer materials or enable mass manufacturing of materials to deploy platforms at lower costs.

Floating offshore wind platforms offer a solution to harness wind power in ocean waters where fixed-bottom foundations are impractical or unfeasible, such as around island nations. For example, Japan has approximately 30 000 km of coastline and extremely deep coastal waters.

However, many floating platforms today were developed for the oil and gas industry or optimised based on those legacy designs over a long period of time. But innovation and new approaches are desperately needed for those optimised designs to evolve and for the industry to achieve lower costs.

Developers can look to the shipbuilding industry to tackle this barrier. For centuries, shipbuilders have been refining the optimal designs and construction techniques based on the materials and technologies available to them in order to put massive floating structures out to sea. At the same time, these shipbuilders have found ways to manage operational and capital costs to keep them relatively low despite the ships' complexity and size.

Drawing inspiration from this industry, where modular construction has long been used to optimise costs and efficiency, floating wind farms can be designed for rapid assembly and reduced input material usage. For example, a modular approach enables local manufacturing, allowing individual components to be fabricated at multiple locations near a particular wind farm site or port and transported to the installation site at sea for assembly. This approach reduces the need for large-scale, single-purpose-built specialised fabrication facilities and minimises the inherent logistical nightmare and excessive costs of transporting large structures.

The focus must first be on the substructure – or platform – design and construction.

The integration of advanced materials and engineering techniques can further drive down costs. Advanced materials, like carbon fibre composites, are lightweight yet supportive and can reduce the overall weight of the platform, thereby lowering material costs and improving platform stability. Adopting hybrid designs that combine the best features of traditional floating platform designs has shown promise in reducing steel usage by up to 70 per cent and cutting mooring loads by 50 per cent, directly contributing to a lower LCOE.

Traditional floating platforms like semi-submersible, tension-leg, and spar-buoy designs require substantial quayside space, or the space around the harbour's platforms that project into the water that is normally used for loading and unloading boats. They also need very deep waters for assembly, turbine towers, and turbine engines before they are deployed at sea.

For a long time, the consensus was that these two issues necessitated costly port upgrades, adding yet another expense to the overall floating wind project and creating a significant financial barrier to the sector's growth. Minimising dependency on specialised port infrastructure is another focus area for lowering costs. Modifying ports to accommodate large floating wind platforms is an additional high investment cost that presents a significant financial barrier to the sector's growth.

As with the foundation and substructure design and construction strategy, at Gazelle Wind Power, we have found that it is possible to work within the constraints of many ports as they exist today by rethinking the approach to platform design and assembly with modular components and local fabrication. Platforms with lower drafts (the vertical distance between the waterline and the platform base) that do not require extensive and expensive dredging could be immensely impactful to achieving this goal. The cost of dredging and deepening ports is not just financial; it also has extensive environmental implications, with potential long-term impacts that could lead to further delays and additional costs.

Modularity in platform design again becomes a viable option here since they can be assembled on-site using existing quayside space. Only a minimal amount of port space would be needed for final assembly. With the remaining space, operators can assemble additional platforms and turbines or continue port operations as normal. This approach is similar to how shipbuilders use floating docks to assemble large sections of a ship before final assembly. Using these techniques, floating wind projects can avoid bottlenecks and high costs associated with specialised port renovations and infrastructure.

Having the right digitilisation strategy is essential to achieving bankability and ensuring the long-term success of the floating wind project.

According to the International Energy Agency, global investment in digital electricity infrastructure and software has grown 20 per cent annually since 2014. Digital tools like predictive maintenance systems, remote monitoring, and advanced analytics are transforming the operational landscape for almost every industry, especially for next-generation renewable energy sources like floating offshore wind. They allow operators to detect potential issues early, make efficient maintenance schedules and processes, and reduce the downtime for turbines.

Digital technology is crucial for floating offshore wind, which requires constant monitoring due to the inherent chaotic and unpredictable forces of nature associated with the high seas. Monitoring systems allow operators to track real-time data on platform performance and even meteorological and environmental conditions. By predicting potential failures before they happen, operators can lower the risk of accidents and enhance the overall safety of maintenance workers and operational staff.

In addition to predictive maintenance, having the right digital assets enables optimised turbine positioning and allows operators and asset managers to make remote adjustments of ballasts or stabilisers, thereby maximising energy output.

One of the biggest financial risks in floating wind project development is the time lag between a project's proposal and securing permits, licenses, risk assessments, or signing a Power Purchase Agreement (PPA). During this lag period, fluctuating economic conditions like inflation, commodity pricing, and interest rates can impact the overall viability of a project. Therefore, financial models need room for flexibility to account for these changing variables.

Clauses that allow for indexation or adjustment of the price for inflation and market changes are crucial to include in any development agreement or PPA to ensure projects can remain profitable even when costs change. Securing long-term contracts for difference (CfDs), where a government will provide the project with a variable premium on top of the market price, can provide reliable and predictable revenue streams, making these projects more attractive to lenders, partners, and investors.

Specialised insurance that covers construction, operational, or even environmental risks can provide an additional layer of security for investors and stakeholders. Allocating risks among the vested parties, including developers, contractors, and insurance companies, further attracts funding for development and deployment with the added benefit of financial stability.

Ensuring the success of the floating offshore wind platforms, projects, and the overall industry requires a multi-faceted approach, and each piece must make sense and fit seamlessly. By focusing on innovative designs, leveraging scalable, modular construction methods, reducing reliance on expensive port upgrades and renovations, embracing digital tools for efficiency, and mitigating financial risks through strategic financial structures, the industry can overcome the cost hurdles and drive widespread adoption. Just like assembling a puzzle, each component – technological, operational, and financial – must come together perfectly to create a sustainable and affordable solution for floating offshore wind deployment.

Alvaro Ortega is CFO of Gazelle Wind Power, the developer of a next-generation floating offshore wind platform.

Italy: understated clean energy potential

Despite challenges like bureaucracy and policy uncertainty, Italy's clean energy sector attracts diverse investors. This is the latest in a series of country analyses where ***TEI Times*** looks at the country's generation and consumption profiles, policy, emissions targets and ability to attract the investment needed to meet government targets.

Italy is a key player in global decarbonisation, with significant potential for clean energy growth. Its commitments include achieving 72 per cent renewable energy capacity by 2030, surpassing global targets. The country's diverse clean energy resources, from coastal wind to southern sunshine, offer extensive opportunities. The investment environment is stable, with various incentives in place, including the EU Green Deal funding. Despite challenges like bureaucracy and policy uncertainty, Italy's clean energy sector attracts diverse investors, and the likelihood of intensified climate action is high.

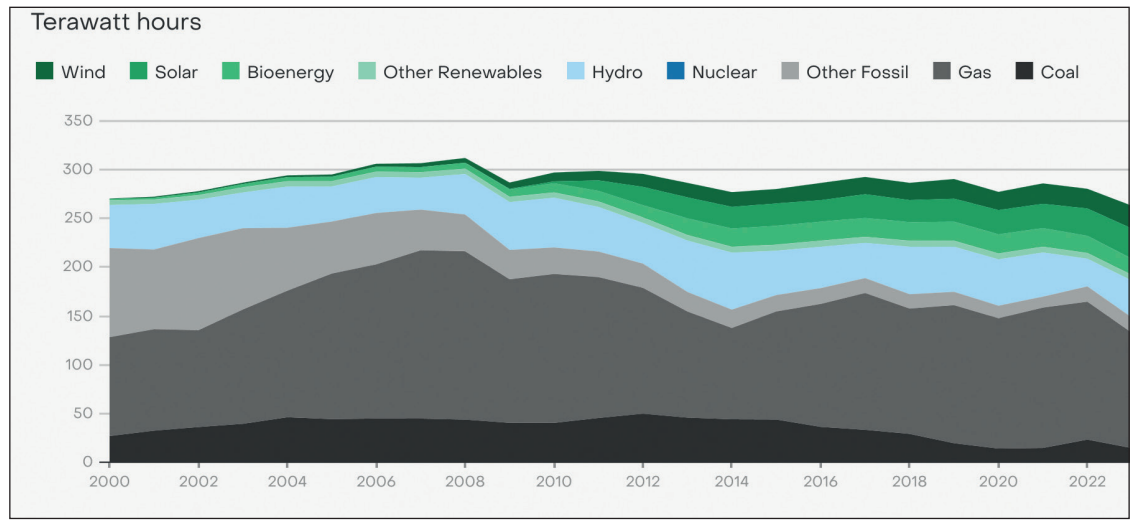
Commitments

Italy holds a significant position in the global decarbonisation effort as a member of both the G7 and the EU, the world's largest proponent of climate action. While the country has implemented various measures, critics argue that its efforts now lag behind its peers. Bain & Co and other experts broadly agree that achieving 2030 and 2050 targets requires robust government action coupled with increased private sector participation. However, this assessment applies to most developed nations. Unique to Italy is the need for enhanced regulation, including a comprehensive climate law, streamlined project approval processes, and accelerated clean energy deployment.

In 2023, renewable energy additions increased by 13 per cent, but an annual growth rate of 17 per cent or more is necessary to reach the country's 72 per cent renewable energy capacity share target by 2030. This goal surpasses the International Energy Agency's Net Zero Emissions scenario, which sets a global target of 60 per cent. The likelihood of intensified climate action by the Italian government is high, driven by domestic social pressures and the increasing frequency of extreme weather events. A study by Bain & Company and Jupiter Intelligence reveals that at least two-fifths of the country faces high risks from extreme climate events, including droughts, fires, and floods.

Energy profile

Italy, one of Western Europe's electricity generation powerhouses, is among the largest power producers in the region with a substantial clean energy footprint and significant growth potential due to its abundant resources. In 2023, it generated 265 TWh of electricity, ranking fifth in Western Europe after France, Germany, the UK, and Spain. Based on calculations from data from the UK's Energy Institute, clean energy accounted for 44 per cent of total production, while fossil fuels represented 56 per cent, with natural gas comprising four-fifths of the latter. The country's per capita CO_2 emissions of 5.7 tonnes in 2022 exceeded the global average of 4.7 tonnes but fell below the EU27's average of 6.3 tonnes, based on figures from the 'Our World In Data' project.



Italy electricity generation by source

Hydropower was the primary clean energy source, contributing over 14.7 per cent of total generation, while the rapidly expanding solar and wind sectors provided 21 per cent in 2023. Notably, Italy reported that renewable energy sources surpassed fossil fuels in electricity production for the first time in the first half of 2024, largely due to increased hydroelectric output. Think tank Ember notes that emissions in the country have decreased rapidly in recent years, primarily due to a steady decline in oil and coal fired generation, partially offset by growth in wind and solar power *(see chart)*.

Experts concur that Italy's coastal regions offer high wind potential, while the south and central areas receive ample sunlight, presenting extensive opportunities for further development of these resources. The country benefits from an average of 2400-3000 hours of sunshine annually, with Apulia, Calabria, Sardinia, and Sicily enjoying particularly favourable wind conditions. Additionally, experts highlight Italy's strong geothermal and biomass resources, further diversifying its renewable energy portfolio.

Investment environment

The nation boasts a stable investment environment, yet it must redouble its efforts to enhance conditions further. Clean energy investments in Italy will chiefly be driven by planned renewable capacity additions rather than a sharp uptick in consumption, particularly as the country's electrification planning remains weak compared to its peers.

Economic growth is expected over the next few years, albeit at a modest rate. The IMF's July 2024 forecast projects an average growth rate of 0.75 per cent between 2024 and 2026. Key renewable investment indicators suggest that Italy offers a reasonable investment climate, but one with considerable room for improvement. Sovereign credit ratings by Moody's and S&P place Italy at riskier levels than its peers, with the nation posting the lowest ratings among G7 countries.

However, Italy ranks in the top 20 per cent globally for innovation and the top third for renewable energy country attractiveness. For other benchmarks, including corruption, press freedom, and justice indices, it broadly ranks in the top quarter. Despite these positive indicators, Italy's investment landscape could benefit from targeted measures to raise its appeal to both domestic and international investors in the clean energy sector.

Investment policy

The country presents a range of investment incentives for clean and renewable energy projects, many of which align with those offered by neighbouring countries. These include Feed-in Tariffs for specific technologies and plant sizes, targeted tax incentives, tradable green certificates, an auction system, or support for investments in certain energy storage systems. Additionally, there are regional incentives, such as grants, loans, or tax breaks, as well as funding linked to the EU Green Deal. The country has also streamlined some authorisation procedures, particularly for smaller projects.

Conversely, investors face challenges similar to those encountered in Spain, Greece, and some of the other EU27 countries. These include complex bureaucracy, which can occasionally be overwhelming, grid infrastructure constraints, and land use regulations. Furthermore, frequent changes in government have contributed to relatively high policy uncertainty; the nation has seen no less than ten changes in government over the past 20 years.

Investors

The Italian renewables market has succeeded in attracting a diverse range of investors, from corporations to private equity firms. In the solar sector, prominent investors include state-owned developer Enel Green Power, state-owned oil major Eni, and infrastructure fund-owned Absolute Energy.

Jacobelli: Italy boasts a stable investment environment, yet it must redouble its efforts to enhance conditions further

Meanwhile, the wind sector features key players such as private sector developer ERG, wind turbine manufacturers Siemens Gamesa Renewable Energy and Vestas Wind Systems, Enel, and Portuguese utility EDP Renováveis. These companies typically operate in multiple countries across Europe and beyond.

Recent years have witnessed a series of significant investments in the Italian renewables market. Some notable examples from the past two years include projects ranging from solar panel manufacturing to solar power, offshore wind, and other technologies. A standout project is Enel's expansion of a solar panel gigafactory in Sicily, with an initial production capacity of 200 MW per year, scaling up to 3 GW per year. The estimated cost of this project is at least €600 million ($668 million). Another project is by Italian developer Renexia which plans to construct a 2.8 GW floating offshore wind farm in the Mediterranean Sea off Sicily, with an estimated cost of around €5 billion ($5.6 billion) per GW.

Prepared for The Energy Industry Times by Joseph Jacobelli at ACTEi.

RENEWABLES INVESTMENT PROFILE	RANK/RATING	YEAR	SOURCE
Business and Finance			
Moody's sovereign credit rating	Baa3 (Stable)	2023	countryeconomy.com
S&P sovereign credit rating	BBB (Stable)	2022	countryeconomy.com
Global Innovation Index	26/132	2023	wipo.int
EY Renewable Energy Country Attractiveness Index	13/40	2024	ey.com
Other			
Global Corruption Perceptions Index	42/180	2023	transparency.org
Reporters Without Borders Press Freedom Index	46/180	2024	rsf.org
World Justice Project of Law Index	32/142	2023	worldjusticeproject.org

Fischells Salt Dome: harnessing the future

As the renewable energy landscape rapidly evolves, innovative solutions for storing and utilising excess energy have become essential.

Julie Lemieux explains how Triple Point Resources Ltd. is playing an important role in the hydrogen value chain through its flagship project, the Fischells Salt Dome – described as "a geological marvel" with significant potential for energy storage and conversion.

As the world strives for carbon neutrality by 2050, hydrogen will play an essential role in decarbonisation. Many countries have national hydrogen strategies in motion, with governments investing billions to incentivise the expansion of a global hydrogen economy.

Considering hydrogen is to be deployed at scale, substantial energy storage will be necessary. Large-scale, underground hydrogen storage is integral to a decarbonised energy system. Often referred to as the "fuel of the future", hydrogen boasts remarkable versatility. It can power fuel cells in vehicles, provide heat for industrial processes and serve as a contribution towards clean energy.

The establishment of global "hydrogen energy hubs" is a pivotal trend, enhancing the economics of hydrogen developments and fostering the growth of the global hydrogen industry. Salt caverns serve as central hubs that support production, storage and transportation for renewable energy regions that play a strategic role in stockpiling energy, mitigating risks associated with offtake agreements and ensuring local, national and international energy security.

Triple Point Resources Ltd (Triple Point) owns the mineral rights to the Fischells Salt Dome, the only known salt dome in Newfoundland and Labrador. It is a unique asset on the Eastern Seaboard of North America that aims to build a minimum of 20 caverns, each with 1.7 million m^3 of storage capacity, in a 5 km-long, 2 km-deep geological formation. Such domes are useful for hydrogen storage because salt is impermeable, and caverns can be created by dissolving it in water. The project is prepared to provide approximately 200 000 tonnes of hydrogen in 35 million m^3 of cavern storage.

This strategic location is ideal for long-duration energy storage for Compressed Air Energy Storage (CAES) and hydrogen storage to harness Canada's vast wind resources. This approach not only enables green hydrogen production for domestic use but also positions Canada for global export. The Fischells Salt Dome's distinctive geological structure is well-suited for storing compressed air and hydrogen at a capacity that effectively offsets fluctuations in renewable energy.

By offering both CAES and hydrogen storage, Fischells unlocks the full potential of Canada's wind-to-hydrogen initiatives. This asset not only meets local energy demands but also establishes Canada as a global leader in the green hydrogen export market. Fischells ensures extended storage duration, allowing energy generated during peak winds to be stored and utilised over longer periods. This capability is crucial for grid stability and seasonal energy balancing, reinforcing Canada's position as a clean energy powerhouse.

The dome's caverns will store and supply energy using compressed air, ensuring reliable reserve power with utility scale renewable energy storage not previously possible. The dome's virtually unlimited storage capacity could offer a safe, secure, and reliable source of energy.

The dome size is currently modelled as 5 km long, 4.5 km wide and 2.1 km deep (including a 500 m of rock cap at the top). There are a minimum 21 large caverns. With each having a capacity of 1.7 million m^3, that would allow storage of 9600 tonnes or 320 GWh per cavern.

Triple Point's primary objective is to establish robust and safe infrastructure for green energy storage while prioritising environmental sustainability. Our work underscores the urgent need for abundant green energy storage capacity as developers in Newfoundland and Labrador begin to advance renewable energy projects across the province. We plan to create a sustainable hydrogen economy that meets local, regional and international energy needs.

The integration of hydrogen with renewable energy sources is crucial for maximising energy efficiency and minimising waste. The Fischells Salt Dome's capacity for large-scale hydrogen storage enables it to act as a dynamic buffer between energy generation and consumption, which helps to enhance energy security and stabilise the grid during times of peak demand.

Our approach to energy storage is vital for converting surplus renewable energy – primarily from wind – into hydrogen and other useful forms. When renewable generation exceeds demand, this excess energy can be converted into hydrogen for later use when demand is high or renewable generation is low.

The Fischells Salt Dome is set to become a cornerstone of energy storage innovation, as the unique properties of salt make it an ideal medium for hydrogen storage. It is impermeable and can be easily shaped into caverns through solution mining.

As the largest known salt dome on the East Coast of North America, our flagship project offers several advantages. These include its extensive size for significant hydrogen and compressed air storage as salt caverns are a mature technology that has been used for decades to store hydrogen. Additionally, the dome's proximity to existing energy infrastructure allows for seamless integration with the local grid.

Fischells, with its immediate access to Newfoundland's wind resources, is primed to convert surplus wind energy into green hydrogen for local consumption or export to Germany and beyond. Located outside of Stephenville, Newfoundland is close to deep-water ports and the strategic location of the dome enables it to support offtake agreements, bolstering the profitability of current and future clean energy projects across Canada.

The ability to store vast quantities of hydrogen for months and provide electricity through compressed air technology, using salt caverns is pivotal in the development of a green energy hub. By providing safe and secure energy storage, this project will establish a consistent supply of renewable energy for local use and international export.

The development of hydrogen storage technologies with the Fischells Salt Dome hold significant economic promise for the region of Newfoundland and Labrador by fostering a local hydrogen economy, the creation of jobs and stimulation, positioning Newfoundland and Labrador as a leader in clean energy innovation.

Recognising that the transition to a sustainable energy future requires collaboration, Triple Point is actively seeking partnerships with government entities, research institutions and other industry players. We believe that innovation and collaboration are key to driving positive change. As we work toward a sustainable energy future, Triple Point is committed to partnering with local communities and stakeholders to ensure that our development practices are not only sustainable but also beneficial for everyone involved.

These collaborations aim to leverage expertise and resources to develop innovative solutions that enhance the economic viability of renewable energy initiatives through research towards advanced technologies and integrating hydrogen into existing energy systems.

Triple Point is advancing a feasibility study and engineering work for its first caverns to better understand the scale and timing required for the Fischells Salt Dome energy storage project, ensuring seamless integration with the region's renewable energy operations.

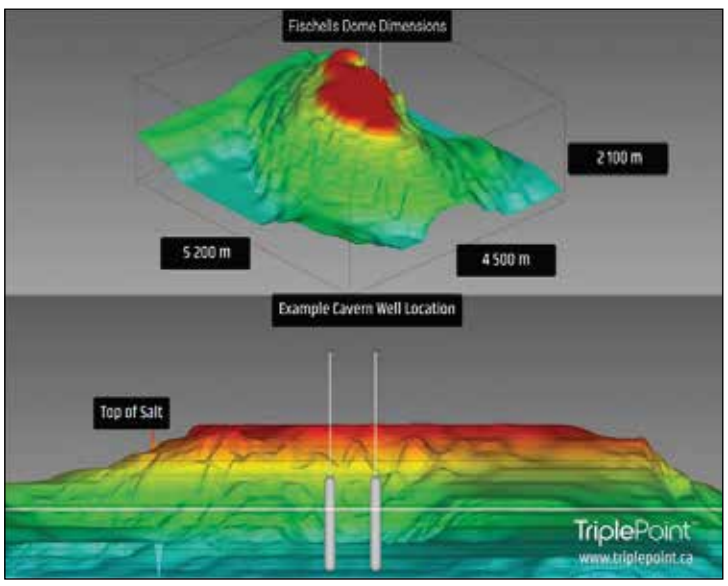
In June 2024, Triple Point announced the results of laboratory analysis completed by RESPEC Company LLC on historical core samples from its Fischells Salt Dome project. The results are very promising, showcasing the project's superior qualities for energy storage and mark a significant milestone in the project's development. They provide important information about cavern characteristics to advance the commercial model.

As regulatory frameworks evolve and investment in clean energy grows, Triple Point's Fischells Salt Dome is poised to become a central hub for hydrogen and renewable energy solutions. Our salt dome symbolises a critical step toward a sustainable energy future. By harnessing the unique geological features of the salt dome and tapping into the power of renewable energy, we can create a cleaner and more efficient energy landscape that benefits our economy and our environment.

As we continue to develop this project, the future of hydrogen and renewable energy is bright.

Julie Lemieux is CEO at Triple Point Resources Ltd.

Lemieux: Fischells Salt Dome is poised to become a central hub for hydrogen and renewable energy solutions



Each cavern has 1.7 million m^3 of storage capacity, in a 5 km-long, 2 km-deep geological formation

Junior Isles

An old dog in need of new tricks

The completion of Unit 4 at the Barakah nuclear power plant in the United Arab Emirates was met with applause at the World Nuclear Association conference in London in early September. It seemed odd. Delegates applauding a power plant startup? Clearly a reflection of an industry unaccustomed to success stories, perhaps. Yet, the room was packed, with the conference a complete sell-out weeks before the opening session – nuclear energy has long been a bit of a conundrum.

The packed room and high spirits of delegates could no doubt be explained by several developments around the world that some might say signal a nuclear renaissance.

In December last year, the 28th United Nations Climate Change Conference (COP28) was hailed as a "historic event for nuclear energy" when it was formally specified as one of the solutions to climate change in the First Global Stocktake of progress toward meeting the goals of the Paris Agreement.

Reflecting on what she called "a crucial moment for all of us", Sama Bilbao y León Director General of the World Nuclear Association, said: "… the world has changed in the last couple of years. The question is no longer whether nuclear energy fits or does not fit in the global energy mix. That question has been answered. The question now is: how much nuclear energy do we need and what is it that we need to do to deliver at the scale and speed that is needed?"

In addition to "producing more energy with the same assets", she told the conference that we could celebrate five reactors being connected to the grid for the first time in 2023 – in China, Belarus, Slovakia, South Korea and the US – adding that she was "excited" about the 64 reactors that are currently under construction across 15 countries.

Last month the International Atomic Energy Agency (IAEA) revised up its annual projections for the expansion of nuclear power for a fourth successive year. World nuclear capacity is now projected to increase by 2.5 times the current capacity by 2050, in the IAEA's high case scenario, including a significant contribution from small modular reactors (SMRs).

"Following the success of COP28 in Dubai and the first ever Nuclear Energy Summit in Brussels, the global momentum behind nuclear energy continues at pace. The new IAEA projections reflect increasing acknowledgement of nuclear power as a clean and secure energy supply, as well as increasing interest in SMRs to target both electric and non-electric applications to meet climate goals and foster sustainable development," said IAEA Director General Rafael Mariano Grossi. He announced the new projections in his opening statement at the 68th IAEA General Conference in Vienna.

At the end of 2023, 413 nuclear power reactors were operational, with a global capacity of 371.5 GW(e). In the high case scenario of the new IAEA outlook, nuclear electricity generating capacity is projected to increase to 950 GW by 2050. In this case, global capacity in 2050 would be slightly more than 2.5 times what it was in 2023. In the low case projection, capacity rises 40 per cent to 514 GW. Small modular reactors, or SMRs, account for about one quarter of the capacity added in the high case scenario and for 6 per cent in the low case scenario.

The enthusiasm also seems to be spreading to the private sector. Last month 14 of the world's biggest banks and financial institutions pledged to increase their support for nuclear power. Microsoft has also signed a 20-year power supply deal with Constellation Energy that should allow for the reopening of part of a US nuclear power plant that was closed in 2019.

Despite this progress and positive outlook, any excitement around nuclear must be tempered by an equal measure of the all too familiar realities of the past and the significant obstacles the sector continues to grapple with.

According to the WNA, the average construction times for the five reactors connected in 2023 was considerably higher than in recent years, with a median time of 121 months, compared to 88 months in 2021 and 89 months in 2022, and a mean construction time of 115 months.

Highlighting the length of time it takes to build nuclear projects Boris Schucht, CEO at Urenco, referred to what he called, "5-5 projects, and even 10-10 projects, where a project takes five times longer than expected and costs five times more than budgeted.

Speaking at the WNA symposium on the need for action and the role of policy, he said: "… it's time to turn some of these ambitions into actions… some of these [policies] are good and some are, shall we say, less than supportive. In our core business, enrichment, I would say we need less political action than in other areas. Why? We are an industry where we could normally take investment decisions based on long term outlook… because our lead time is much shorter than for construction and a project [developer] usually buys the fuel before they take a final investment decision. So we have enough time to prepare our assets and set capacity to follow demand. So in this area [nuclear fuel cycle] we need less intervention."

While governments of countries such as Sweden, UK, and France have set out their ambitions to drive nuclear, finance still remains a huge stumbling block to the roll out of nuclear projects in the west.

Projects are difficult to fund. At the WNA symposium, during the session titled 'Breaking new ground – delivering on time, on budget and on scale', Stéphane Aubarbier, Deputy CEO, Assystems said that money is available but comes at a high cost, noting that the cost of capital needs to be lower, and that cost could be lowered if risk can be reduced.

"If we are not able to deliver on time, I'm afraid we will not be able to seize the current opportunity… the faster we deliver, the cheaper the power," he said.

The upfront costs of nuclear are eye-wateringly high and construction times are long, making risk unpalatable for most. Speaking to the *Financial Times*, Jens Weibezahn, assistant professor at the Copenhagen Business School explained that if the company set up to construct a project defaulted, "a half-built nuclear plant would be pretty worthless as security". The interest lenders would demand for that level of risk would simply make projects unviable, he said.

Overruns on time and budget of ongoing projects do little to instil confidence. According to EDF's most recent estimates, the initial £18 billion budget for the 3.2 GW Hinkley Point C plant in southwest England, had ballooned to £31-35 billion in 2015 prices (£41.6-47 billion in today's money).

Last month Sweden's Energy Minister Ebba Busch said that her country was looking at potential risk-sharing mechanisms to counter some of the problems. Several other countries are also considering models such as the regulated asset base, where consumers start paying towards the construction of nuclear projects before they begin operation.

In this economic climate, such an approach could be a hard sell to the public. If it adds to already sky high energy bills, elected government ministers could soon find themselves sitting on the opposition bench.

The world may need nuclear but the question is do politicians have the appetite and money to drive a nuclear renaissance? History tells us that this potential revitalisation will need more than a few pep pills. Nuclear is an old dog that needs some new tricks.

Cartoon by Jem Soar