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EU raises renewables ambition, as France secures nuclear concessions

Simson says the upgraded target sends “the right signal”

The EU has voted to increase its target for renewable power generation after agreeing to concessions on nuclear. The deal could also help pave the way to long awaited electricity market reforms, stalled by an impasse between France and Germany. **Junior Isles**

EU lawmakers have voted to increase the bloc’s share of renewable energy to more than 40 per cent by 2030 and to relax permitting procedures. The agreement was reached after concessions on the production of ammonia from nuclear energy were secured to end a dispute between France and Germany.

The European parliament’s vote will increase the share of renewable power in the EU’s energy mix from a 30 per cent target to 42.5 per cent by 2030.

The Renewables Directive is part of the EU’s Green Deal climate law, which aims to position the bloc as a leader in environmental regulations.

But since its announcement in 2019, the EU has fallen behind in the global race for clean technology as it tries to compete with huge subsidies in China and the US.

Kadri Simson, the EU’s Energy Commissioner, said the upgraded target was “the right signal to attract the massive investment required” and that “the new permitting [procedures] will be a game-changer for renewable deployment”.

Brussels has made increasing renewable energy targets a top priority after gas supply from Russia was steadily cut off after the invasion of Ukraine. About 130 GW of renewable

energy projects – equivalent to about 120 billion m³ of gas – are awaiting approval in the EU, according to the European Commission.

Under the new legislation national authorities should only take up to two years to approve renewables projects by allowing them to be recognised as having an overriding public interest and by simplifying the permitting procedures.

Commenting on the agreement, Markus Pieper, a German politician who led negotiations on the renewables law, said: “We need to be a little bit careful in the EU. We have 24 per cent renewables in the energy mix,

twice as much as worldwide, but the EU last year only... installed half the wind turbine capacity compared to the global average.”

Final approval on the agreement was delayed after France made a late push for better recognition of nuclear power but got the seal of approval after small concessions on the production of ammonia from nuclear energy were secured.

The concessions to bridge the divide between France and Germany will also help pave the way in the negotiations on the reform of the electricity market. The two countries have been

Continued on Page 2

Global investment in renewables hits new records

Global new investment in renewable energy skyrocketed to \$358 billion in the first six months of 2023, a 22 per cent rise compared to the start of last year and an all-time high for any six-month period, according to BloombergNEF.

China was again the largest market in 1H 2023, with \$177 billion of new investments, up 16 per cent from 1H 2022. The US secured \$36 billion, while Germany drew \$11.9 billion.

Solar was the key driver of the 1H 2023 results. A total of \$239 billion was invested in large- and small-scale systems, making up two-thirds of total global renewable energy investment over the first six months of the year and marking a 43 per cent rise compared to 1H 2022.

China accounted for roughly half of all large- and small-scale solar investment in 1H 2023. This was mainly driven by lower module prices, a robust rooftop PV market, and the commissioning of the country’s so-called energy megabases, which aim to develop large-scale wind and solar installations mainly in desert areas.

The US was a distant second, with \$25.5 billion invested in large and small-scale solar during 1H 2023. However, this was an all-time record and a 75 per cent increase from 1H 2022 as supply chain constraints eased and clarity grew around the country’s landmark Inflation Reduction Act (IRA).

In sharp contrast to the growth in solar investment, wind power investment declined 8 per cent compared to 1H 2022, reaching \$94 billion over the first half of 2023.

Onshore wind investment has declined for four straight quarters. The sector received \$64.5 billion of investment in 1H 2023, a 21 per cent drop compared to the first half of last year. Grid constraints, permitting challenges and faltering policy support in multiple markets are leading to a reduced global pipeline of ready-to-develop projects, which in turn is denting asset financing volumes. China accounted for two-thirds of onshore wind investment, with \$38 billion invested in 1H 2023. This marked a 22 per cent decline compared to 1H 2022, as falling

equipment costs have allowed each dollar invested to go further and as a smaller share of large megabase projects still awaited financing.

Offshore wind investment posted a strong 47 per cent increase relative to 1H 2022, to \$29.2 billion over the first six months of 2023. Europe accounted for the majority of this growth, with \$9.4 billion more investment in 1H 2023 than in 1H 2022. Japan and Taiwan also experienced growing offshore wind investments.

In its new ‘Global Offshore Wind Report 2023’, the global offshore wind industry delivered its second best year for new capacity in 2022, with 8.8 GW connected to the grid around the world, according to the Global Wind Energy Council (GWEC).

The report forecasts that 380 GW of new offshore wind will be built by 2032 – nearly half of which will come from the Asia-Pacific region. The size of the potential in the APAC region, combined with the number of new countries turning to offshore wind for their energy needs, marks the next

frontier for this technology, says GWEC. More than 180 GW of capacity has been identified in the region outside of China, with Australia alone accounting for more than 50 GW.

Ben Backwell, CEO, GWEC, said: “The offshore wind sector has delivered another year of impressive growth to reinforce last year’s record numbers. This report outlines that the potential is there for record growth every year from now on. This would deliver a transformed, clean, secure energy system – particularly in the Asia-Pacific region.

“However, governments and industry across the world will need to work together if this potential is to be realised, while trade and industrial policies will need to focus on partnership and collaboration to deliver investment and growth.

“Renewable Power Generation Costs in 2022”, published by the International Renewable Energy Agency (IRENA) shows that the renewable power added in 2022 reduced the fuel bill of the electricity sector worldwide.

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at loggerheads since Berlin's refusal to open financing contracts for difference to existing nuclear plants because it considered that it benefited Paris excessively.

This type of contract is between an electricity generator and a public entity, usually the State, and stipulates that the seller will pay the buyer the difference in the price of energy from the time of purchase to the signing of the contract, thus limiting the generator, which receives a stable income for the electricity it produces.

Last month the Spanish presidency of the Council of the EU put forward a proposal that seeks to bring both countries closer together. According to *Europa Press*, the new text allows a price to be set in the event of an extension of the useful life of the nuclear power plants that benefit from these incentives, thus preserving the autonomy of the Member States to choose their energy mix while introducing controls to ensure that this does not distort the market.

The EU is under pressure to reform its energy market in order to reduce energy prices by cutting dependence on gas, while at the same time accelerating its efforts to drastically lower carbon emissions.

In early September a new position paper by Corporate Leaders Group Europe called on the EU to reduce its 2040 greenhouse gas emissions by at least 90 per cent compared to 1990 levels, to avoid passing irreversible tipping points.

CLG Europe, with members from Coca Cola, Unilever and Salesforce, Velux and Signify, are in support of this target. It follows a recent commitment by a number of companies to reach net zero emissions by 2040 under the Climate Pledge.

The 2040 target debate is an



Pieper said the EU needs to be "a little bit careful" as it fell behind the average for wind turbine installations last year

opportunity for the EU to send a clear signal to businesses that climate action will remain at the heart of the EU's political agenda for the next two decades, according to the report. This will provide them with the predictability they need to invest early in the transition.

A recent study launched by Siemens Smart Infrastructure found that fewer than 50 per cent of organisations expect to meet decarbonisation targets by 2030.

The report, titled 'Siemens Infrastructure Transition Monitor 2023: The Great Divide on The Path to Net Zero', reveals that there is limited alignment on priorities and how best to progress towards a decarbonised and resource-efficient world. Whilst more than half of the 1400 people surveyed believe the infrastructure transition is accelerating in their region, a quarter of participants – senior executives from seven major industry groups – said that progress is "too slow". Some 29 per cent believe progress is "coordinated", while 31 per cent describe it as "on target".

"Beginning of the end" for fossil fuels

The International Energy Agency has predicted that demand for fossil fuels will peak by the end of the decade, saying it shows climate policies are working. Yet more has to be done to win over the fossil industry as COP28 approaches. **Junior Isles**

The world is at "the beginning of the end" of the fossil fuel era, according to the International Energy Agency (IEA), which for the first time has forecast that demand for oil, natural gas and coal will peak before 2030.

The Paris-based agency predicts that fossil fuel consumption will start to fall this decade because of the rapid rise of renewable energy and use of electric vehicles.

"We are witnessing the beginning of the end of the fossil fuel era and we have to prepare ourselves for the next era," said Fatih Birol, Executive Director of the IEA. Commenting on the projections, due to be published this month in the organisation's 'World Energy Outlook', he added: "It shows that climate policies do work."

In a separate report, Ember, the global energy think-tank, noted that fossil fuels produced just 33 per cent of the EU's power in the first half of this year, the lowest share on record based on

data going back to 1990.

Across the EU's 27 member countries, fossil fuel-based power generation fell by 17 per cent in the first half of the year, compared with the first half of 2022, Ember said. The drop in fossil fuel generation was driven by a fall in demand for electricity, as well as some growth in clean power, the study found.

"We're glad to see fossil fuels down, but in the long-term it is not going to be sustainable to rely on the fall in demand to do this," said Matt Ewen, a data analyst at Ember and author of the report. "We have to be replacing this energy rather than just expecting it to go away and not be used."

Coal, the most CO₂-emitting fossil fuel, posted the steepest decline. In May, coal produced less than 10 per cent of EU electricity for the first time on record.

Commenting on the trend of falling fossil fuel use, Birol said large new fossil fuel projects ran the risk of

becoming stranded assets. He acknowledged, however, that some investment in oil and gas supplies would be needed to account for declines at existing fields.

Despite increasingly falling out of favour, the International Monetary Fund (IMF) revealed that global fossil fuel subsidies hit a record total of \$7 trillion in 2022 as governments rushed to shield consumers from soaring energy prices sparked by Russia's invasion of Ukraine.

The IMF study said subsidies for coal, oil and natural gas in 2022 were equivalent to 7.1 per cent of global gross domestic product.

The figure produced by the IMF includes so-called implicit subsidies, which are the result of governments undercharging for the environmental costs incurred by burning fossil fuels. These costs include air pollution and global warming, the IMF said.

Last month US climate envoy John

Kerry expressed anger over coal production in Asia at the end of a UN climate meeting in New York. During the run-up to the meeting he also met global oil and gas industry leaders to urge them to bring concrete plans to boost renewable energy and cut greenhouse gas emissions by 2030.

Kerry told the *Financial Times* that he believed it was vital that the oil and gas industry be involved in the COP28 UN climate talks and be held to account for its involvement in global warming.

"We have to get the fossil fuel industry at the table. We have to bring them to this effort, and they have to join in by being responsible," he said in an interview.

Kerry said he had asked the oil and gas executives to come with plans to COP28 to reduce their direct emissions and emissions derived from energy that they purchase, known as scope one and two emissions, by 2030.

US\$2.7 trillion a year investment needed to achieve net zero by 2050

The total investment needed to decarbonise the energy sector is estimated to cost \$1.9 trillion a year, and this will need to increase by 150 per cent – or \$2.7 trillion a year in order to meet the 1.5°C target, according to a report by Wood Mackenzie. More than 75 per cent of this investment is needed in the power and infrastructure sectors, said the company.

According to its latest 'Energy Transition Outlook' analysis the world is currently on a 2.5°C warming trajectory, and if transformative action is not taken now, the Paris Agreement goal to limit the average temperature increase to below 1.5°C will likely be missed.

The report finds that low carbon power supply and infrastructure needs to scale up at twice the pace built in the last decade – made more difficult by the current delays that renewable

energy assets face due to limited grid interconnections.

A minimum of \$1.4 trillion a year (base case) must be invested in renewables, infrastructure and energy transition technologies. Annual spend into these sectors has to rise to \$2.4 trillion to achieve net zero.

"Net zero pledges now cover 88 per cent of annual global emissions. But no major country is on track to meet their 2030 emissions reduction goals, let alone net zero. Policy landscape is shifting to direct incentives and targeted support to accelerate the development of new technologies, but countries need to urgently address obstacles including permitting restrictions and constraints in the electricity supply chain," said Simon Flowers, Chairman and Chief Analyst at Wood Mackenzie.

In Wood Mackenzie's base case, energy-related emissions will peak in

2027 and fall roughly 25 per cent by 2050 from 2019 levels. With low carbon energy's share of final consumption growing to 14 per cent by 2030 and 28 per cent by 2050.

"The supply of low carbon energy has grown by a third since 2015, but the world's energy demand has grown much faster with rising incomes and populations. The good news is that sustainability is alive and kicking, spurred on by policy including the introduction of the US Inflation Reduction Act and Europe's REPowerEU. Achieving 1.5°C is going to be extremely challenging, but it is possible and greatly depends on actions taken this decade," added Flowers.

A separate report published by S&P Global Ratings, said decarbonisation targets set by the world's major economies will require at least a tripling of global energy transition investment

to over \$5 trillion each year between 2023 and 2050 – well beyond what government balance sheets can handle alone.

According to S&P Global Commodity Insights, the annual funding gap to meet net zero targets could be as large as \$700 billion. This funding gap is highly concentrated in emerging markets, owing to higher risk.

Last month a UN stocktake of global efforts to limit warming concluded that the world is way off track to tackle climate change and remains headed for a temperature rise of up to 2.6°C.

The global stocktake was designed under the Paris Agreement to assess the global response to the climate crisis and chart a better way forward. The global stocktake is held every five years and is intended to inform the next round of nationally determined contributions to be put forward by 2025.

Lagging policy support and rising costs put investment plans for hydrogen at risk

The International Energy Agency (IEA) 'Global Hydrogen Review 2023' has noted the slow roll out of low-carbon hydrogen projects despite the impressive global pipeline.

Only 4 per cent of the announced low-carbon production projects have thus far reached final investment decision (FID) or construction phase, while grey hydrogen continues to dominate (99

per cent) the global landscape.

Yet despite economic headwinds, deployment of electrolyzers is beginning to accelerate. By the end of 2022, electrolyser capacity for hydrogen production reached almost 700 MW. Based on projects that have reached final investment decision or are under construction, total capacity could more than triple to 2 GW by the end

of 2023, with China accounting for half of this. If all announced projects are realised, a total of 420 GW could be achieved by 2030, an increase of 75 per cent compared to the IEA's 2022 review.

In late August the European Commission published the terms and conditions of its pilot auction dedicated to European renewable hydrogen pro-

duction, which is scheduled to open on November 23rd.

The auction is financed by the Innovation Fund, set up last spring to facilitate meeting the target of 20 million tons of green hydrogen in the EU by 2030. Of this, 10 million tons should be produced by member states and the remaining 10 million imported from other countries.



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Brazilian companies move allegiance towards low carbon options

- Petrobras opens the way to becoming the biggest offshore wind owner
- EDP disposes of coal fired power plant

Janet Wood

Brazil's state-owned oil and gas company Petrobras has announced plans for a major investment in offshore wind that would make it the country's largest offshore wind owner. It wants to develop up to 23 GW of wind farms off the Brazilian coast, including a floating wind project in Rio de Janeiro that may supply the company's production platforms.

The group kicked off its plan with a request to the Brazilian Institute of

Environment and Renewable Natural Resources (IBAMA) to start the environmental licensing process for ten areas, in areas off Rio Grande do Norte, Ceará, Maranhão, Rio de Janeiro, Espírito Santo and Rio Grande do Sul. All except the area off Rio de Janeiro have water depths of less than 100 m.

Petrobras said it is already conducting the largest wind mapping campaign in Brazil. It said the request to start licensing was a sign of its interest in developing its own projects, in addition to partnership projects such as the

seven areas being studied jointly with Equinor with the potential to generate up to 14.5 GW.

Meanwhile, EDP has reached an agreement with a group of Brazilian investors coordinated by Mercurio Asset for the sale of an 80 per cent stake in its coal fired power plant, Pecém Geração de Energia. The agreement, which includes an option to sell the remaining 20 per cent when the current power purchase agreement ends in July 2027, values the power plant at €366 million. EDP will retain 100 per cent

of the management of a 1.25 MW renewable hydrogen project that began operating in December 2022 at the Pecém complex.

The 720 MW Pecém power plant in the state of Ceará "plays an important role in supporting the security of the electricity supply to the Northeast region of Brazil, where electricity consumption and the capacity for production capacity have been growing steadily," said the company in a statement.

It added: "This transaction is an

important milestone in achieving EDP's strategic goal of being coal free by the end of 2025. Regarding the last three coal fired power plants still in its portfolio, located in Spain, EDP continues to actively develop decommissioning plans of the Soto and Los Barrios plants, which require authorisations from the respective electricity system operator, as well as a plan to convert the Aboño plant from coal to gas. At the same time, EDP is developing just transition projects at these sites, namely renewable hydrogen projects."

Nova Scotia announces Nova East Wind project on anniversary of seabed lease offer

Nova East Wind has announced plans to build a 400 MW floating offshore wind farm in Nova Scotia, Canada. DP Energy and SBM Offshore formed a joint venture to pursue floating offshore wind opportunities in Nova Scotia in July, after the Government of Nova Scotia announced in September 2022, that it would offer seabed leases for 5 GW of offshore wind energy by 2030, starting in 2025, with an ultimate aim to support green hydrogen.

Simon De Pietro, Chief Executive of DP Energy, said: "We are delighted to announce our new floating offshore wind project with partner SBM Offshore, the first of its kind in Canada."

The two companies said the floating offshore wind farm would be located

up to 30 km off Goldboro, Nova Scotia. The final location of the wind farm will be determined following engagement with key stakeholders and rights holders, such as First Nations, governments, commercial fishers, local communities, environmental groups, and industry regulators.

"We are very pleased to announce Nova East Wind's project off Goldboro today, bringing our contribution to the energy transition in Canada. We intend to do so with a special attention to local workforce, supply chain and communities to kickstart Nova Scotia's floating offshore wind sector responsibly," said Ambroise Watzet, Director of Project Development at SBM Offshore.

First Nations in Canada's Alberta state win renewable energy funding

Canada's Alberta state is to provide more than \$175 million in support for 12 wind energy, solar energy and microgrid projects in the state via Natural Resources Canada's Smart Renewables and Electrification Pathways Program (SREPs).

Vittoria Bellissimo, President and CEO, Canadian Renewable Energy Association (CanREA) said: "CanREA welcomes this federal investment in Indigenous-led clean energy projects, which will create jobs and opportunities for Albertans while also helping the province deliver on its decarbonisation goals. I want to congratulate these CanREA member companies and wish them success with their upcoming projects."

Over \$20 million will support the

150 MW Lanfine Wind 1 project, while \$60 million will support four wind farm sites near Jenner, Alberta. Over \$17.5 million will support the 105 MW Hilda project in Cypress County. In addition, over \$62 million will support work to modernise assets, upgrade systems and deploy advanced metering infrastructure across rural, remote and urban communities.

Meanwhile Akamihk Energy, a Montana First Nation-owned company, will receive \$1 million to investigate integration of electricity distribution infrastructure and service on Montana First Nation's lands into a consolidated microgrid, manage energy flows within the grid, and meter exchange to the Alberta Interconnected Electric System.

US opens \$300 million funding opportunity to speed transmission expansion

- Funds can be accessed by permitting authorities
- Grants aimed at smoothing development process

Janet Wood

The US Department of Energy (DOE) has announced funding of up to \$300 million in grants for states, tribes and local governments in an initiative intended to accelerate and strengthen transmission grid expansion.

The Transmission Siting and Economic Development (TSED) grant programme will be administered by DOE's Grid Deployment Office, and it is designed to overcome state and local challenges and support communities along new and upgraded lines.

Faster installation of new electric transmission infrastructure is essential to meet the Biden-Harris administration's goals of reaching 100 per cent clean electricity by 2035 and halve US greenhouse gas emissions by 2030 and the funding is the first tranche of a \$760 million programme established by the Inflation Reduction Act. Other efforts to advance transmission build-out include streamlining federal reviews of transmission projects and investing in grid upgrades.

"To meet our ambitious clean energy goals, we need to expand the nation's transmission capacity by 60 per cent over the next seven years," said US Secretary of Energy Jennifer M. Granholm. "Now, thanks to President Biden's Investing in America agenda, we have the funding to build-out a grid chock-full of clean, cheap, reliable electricity and accelerate transmission expansion while creating good-paying jobs across the country."

The TSED grant programme will provide financial support to entities that are responsible for issuing permits for transmission projects. It will fund studies, modelling, environmental planning and analysis to assess alternatives, better inform decision making and reduce the time it takes to process applications.

Within the funding opportunity announcement (FOA), TSED grants are available to state, tribal, and local government applicants to support engagement, economic development, and other benefits in communities that may be affected by the construction

and operation of interstate or offshore transmission projects.

Community-based projects can include: energy investments such as resilient microgrids, renewable power integration or electric vehicle charging infrastructure; support for community facilities such as improved transit; or investing in community centres and creating green spaces. Funds can also be used to support the workforce with job training and apprenticeship programmes.

While transmission developers are not eligible for TSED grants, they can be key partners working with siting and permitting agencies to propose innovative solutions to improve cross-jurisdictional coordination, strengthen permitting processes, and resolve permitting bottlenecks. The programme is intended to add to existing developer-funded community benefits programmes, encourage innovation and be driven directly by communities and their needs. Final applications will be made to the grant scheme in Q2 2024.

Puerto Rico Electric Power Authority may be set to emerge from bankruptcy

Puerto Rico's Electric Power Authority has made a third attempt to restructure to end a lengthy bankruptcy process.

The company is \$10 billion in debt, but the new plan, filed by a federal control board that oversees the US territory's finances, would cut the debt of Puerto Rico's power company by nearly 80 per cent to some \$2.5 billion.

"We hope that we will be closing not just the chapter but most of the book on the largest public sector bankruptcy

in the United States," Robert Mujica, the Board's Executive Director, said in a meeting with reporters.

If confirmed by a federal bankruptcy judge, the plan would mean an increase in already high power bills for many people on the island if the new charge is approved by Puerto Rico's Energy Bureau, although 1.4 million customers who use less than 425 kWh a month would not pay the new charge. The average monthly power consumption

for a US residential customer is about 886 kWh, according to the US Energy Information Administration.

The island of 3.2 million people has been hit by power outages since Hurricane Maria in 2017. The newest debt restructuring plan is backed by bondholders who agreed to buy new bonds. "Nobody wins... if (the power company) remains financially unstable," Board Chairman David Skeel told reporters.



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Kerry becoming “more angry” over Asian coal use

US climate envoy John Kerry's outburst against continued coal production and use in Asia highlights the difficulty negotiators will face in reaching any consensus on fossil fuel phase-out at the upcoming COP28 climate summit.

Junior Isles

US climate envoy John Kerry has expressed anger at new coal production in Asia, saying it “wipes out” carbon emissions reductions from Europe and the US.

Visibly frustrated following the UN climate summit in New York last month, Kerry told ministers at a meeting that he felt “increasing anger” over “what is going on, and what is not going on”.

Kerry said the scale of coal power expansion planned in Asia, which includes major producers in China, India and Indonesia, would make it “impossible to achieve 1.5 degrees”,

the level set under the Paris accord as the ideal limit to avoid irreversible climate change. The world has already warmed by at least 1.1°C

“What infuriates me, frankly – and I find myself getting more and more angry about this – is we are not stopping at a broad enough scale, the contributions to the problem. And by that I mean emissions are going up,” Kerry argued. “People continue to plan and build and burn unmitigated, unabated fossil fuel.”

Kerry's outburst reflects the divide between developed and developing economies. With the US and Europe being the largest historical polluters, the issue looks set to resurface at the

UN COP28 climate summit in Dubai at the end of November.

The US is itself among the top five coal producers in the world, and has come under fire from developing nations who still rely on the polluting fuel.

While China is the world's largest producer of renewable energy capacity and dominates solar and wind technology, it is also burning large amounts of coal to meet its energy needs. International Energy Agency data shows that together China and India set monthly records for coal energy production in March 2023 and burned 70 per cent of the world's coal. In a coinciding speech to diplomats

in China, Kerry's Chinese counterpart, Xie Zhenhua, said it was “not realistic to phase out all fossil fuels”. However, he added that carbon capture technology could be used to lower the emissions when fossil fuels are burnt. The technology is not proven at scale, although China is attempting its own development at various oilfields.

During the New York summit Kerry also called on oil and gas executives to establish a standard for carbon capture, utilisation and storage (CCUS). “This would ensure we're actually reducing emissions and not simply extending this process,” he said.

“The question is, can you bring it to

scale? Can you get this [CCUS] to work well enough and big enough so that you are in effect staying on the Paris [agreement] curve [for a temperature rise of 1.5°C]? That has to get down to net zero by 2050 or better. And that, I think, is very much at issue now.”

At COP28, negotiators from nearly 200 countries, including the US and China, will need to co-operate to reach agreements crucial to sticking to the Paris Agreement. Some negotiators are hoping to include wording and a timeline for the end of fossil fuels, and upgraded targets for beyond 2030 in the final COP28 agreement, despite resistance from petrostates and fossil fuel producers.

PLN's ambitious renewables target lacks government support

■ PLN says 75 per cent of new capacity will be renewables

■ Country set to miss 7.2 GW geothermal target

Syed Ali

State utility PLN's plan to add 32 GW of clean power generation capacity and reduce its reliance on coal will face many challenges, especially if the Indonesian government remains reluctant to disincentivise the coal industry and to subsidise renewable energy investment.

Greenpeace Indonesia climate and energy campaigner Adila Isfandari said pushing renewable energy requires more government incentives for the sector, and disincentives for the coal business. “The energy transition is a zero-sum game. We cannot keep the coal while adding renewable energy. We need to stop the former so that the latter can come in,” she said.

Under PLN's latest proposal, 75 per cent of the company's additional capacity would be based on renewable sources, a massive step up from the current target of 51.6 per cent.

The new target, still under discussion, is to be included in a new long-term electricity procurement plan (RUPTL) for the period of 2023 to 2032, which is set to replace the current RUPTL that lays out the state-owned utility's plans for the 2021-2030 decade. The current RUPTL published in 2021, only aims for 10.6 GW in additional electricity generating capacity from renewables by 2025

and 20.9 GW by 2030.

The Just Energy Transition Partnership requires Indonesia to have renewable energy account for at least 34 per cent of nationwide power generation by 2030. However, Adila expressed doubt that PLN would reach the target as the historical trend showed that growth of clean power generation capacity had been slow over the past decade due to a lack of financing interest.

The Indonesian Geothermal Association (INAGA) recently noted that Indonesia is set to miss its target of 7.2 GW of installed geothermal power capacity because of high development costs and a lack of supporting regulation.

INAGA Chairman Prijandaru Efferendi said Indonesia's geothermal energy development was moving at a “very slow pace” as the country had only seen an average annual increase of 60 MW in nationwide capacity over the last 40 years.

■ At the end of August Indonesia almost halved output at the 1600 MW Suralaya coal fired power plant, near the capital Jakarta, after the city faced major pollution spikes. The move came just ahead of a crucial summit involving leaders from the Association of Southeast Asian Nations (ASEAN), as well as officials from the United States, Japan, China, and South Korea.

Malaysia to launch energy transition fund

Malaysia will establish a National Energy Transition Facility (NETF) with an initial seed fund of MYR2 billion (\$431 million) to support energy transition projects, according to Prime Minister Anwar Ibrahim.

NETF will catalyse blended financing from the private sector and international sources to improve financing access for important energy transition projects that have not reached a bankable commercial stage, the Prime Minister explained at an energy transition

conference at the end of August.

At the conference, Ibrahim launched the second phase of the National Energy Transition Roadmap (NETR). Phase one was unveiled in July. It included 10 flagship catalyst projects across six energy transition levers – energy efficiency, renewable energy, hydrogen, bioenergy, green mobility, and carbon capture, utilisation and storage (CCUS).

In addition to these, NETR outlines 50 initiatives under the six energy

transition levers and five enablers, which are: financing and investment, policy and regulation, human capital and just transition, technology and infrastructure, and governance and implementation.

Under the NETR Malaysia's energy transition financing needs are estimated at between MYR1.2 trillion and MYR1.3 trillion by 2050. The roadmap sees the installed renewable energy capacity target raised to 70 per cent by 2050 (from 25 per cent today).



Philippines eyes solar and wind as coal plants face early retirement

The Philippines Department of Energy is making good progress towards its target of increasing renewable energy (RE) to 35 per cent by 2030, while accelerating the closure of coal fired power generation.

Renewables accounted for about 22 per cent of the Philippines' energy mix, with coal fired power plants providing nearly 60 per cent as of the end of 2022. The government hopes to further extend the share of renewables in the energy mix to 50 per cent by 2040.

Speaking at a conference last month Energy Assistant Secretary Mylene C. Capongcol said the government has awarded 77 offshore wind energy contracts to date, as well as eight contracts to develop ocean, tidal, and wave energy projects.

“Right now, we have awarded 77 offshore wind energy contracts with a potential capacity of 60 GW,” she noted.

Citing a number of DoE studies and

assessments, Capongcol said the Philippines has a potential RE capacity of about 500 GW.

Wind projects – both onshore and offshore – accounted for 254 GW of the potential capacity, while ocean and marine energy accounted for 170 GW, with solar amounting to 58 GW. Combined potential capacity for biomass, geothermal, and hydropower is estimated at about 10 GW.

The news came as three multilateral banks proposed a financing programme to the government worth \$2.67 billion to voluntarily expedite the retirement and repurposing of coal-fired power plants, mitigate the impact of the transition to the people and enable financing of clean alternatives.

The Asian Development Bank (ADB), the International Finance Corp. (IFC) and the World Bank (WB) released a draft business plan, in consultation with the government of the Philippines, to identify potential areas where they can invest in.

The so-called Climate Investment Fund (CIF) Accelerating Coal Transition (ACT) Program Investment Plan Report (IP) proposes \$500 million in CIF-ACT funding – leveraging \$1.336 billion in multilateral development bank co-financing and \$830 million in other co-financing – to implement investments for accelerated energy transition under a holistic coal phase-down approach.

The report states that coal accounted for 44 per cent of the total installed generation capacity and 60 per cent of the total generation in 2022, which resulted in an increase in the Philippines' carbon dioxide emissions. Coal also accounted for 55.4 per cent of the country's total emissions by fuel type last year.

The report said the average age of coal fired power plants in the country was 12-13 years and could potentially hinder efforts to reduce emissions and make room for renewable energy.

Lack of grid capacity continues to put net zero transition under pressure

- Networks and EU call for faster permitting
- Market design proposals split network users over benefits

Janet Wood

Legislators must “embrace an anticipatory approach” to future-proof electricity networks, says European energy network lobby group Eurelectric in a new report. It wants electricity market design reform to incentivise forward investment, longer-term grid planning, digitalisation, flexibility and data exchange.

The organisation says by 2030 over 600 GW of additional renewable capacity will be in operation, with the majority – around 70 per cent – directly connected to distribution grids.

But it says Europe’s power distribution grids have scarce capacity, cumbersome permitting and insufficient investment.

“Getting our electricity networks fit for net zero should be a top priority in the coming years, both at EU and national level,” said Eurelectric Secretary General Kristian Ruby, adding, “this requires a new mindset among regulators and legislators.”

Eurelectric said the EU currently invests €23 billion per year in grid infrastructure. But “this is way too low: investment in distribution grids should reach no less than €38 billion

per year until 2030 and up to €100 billion per year until 2050”.

Some large enabling projects have received permits: recently Scottish and Southern Electricity Networks Transmission and National Grid Electricity Transmission celebrated the grant of planning consents for the on-shore and offshore elements Eastern Green Link 2, a high voltage direct current cable that still awaits approval from regulator Ofgem.

The 2 GW link will transmit power between generators in Scotland and demand customers in England. Great Britain hopes to partially address the

connection queue with new rules that would incentivise new parties to locate so that demand is close to supply. The proposal would split the market – either into ‘zones’ or disaggregating it even further so that different prices would be set at every network ‘node’ – as part of a new energy market reform package.

Similarly, the EU is proposing new market rules that would take more account of location in price setting. But market participants are divided over whether further locational pricing would allow a more efficient market to emerge or add cost and further

complexity for users without reducing congestion.

Market redesign also has to benefit new system services such as batteries. A new report from LCP Delta on battery investment says that some revenue streams are drying up because new markets such as those for frequency response are saturated.

LCP Delta’s report also warned that locational pricing could lead to lower margins for batteries in less optimal sites, while those found near electricity demand centres in under-supplied zones could enjoy more favourable revenues.

TotalEnergies to be majority partner in 4 GW of new European renewables

TotalEnergies and European Energy have agreed to jointly develop, build and operate at least 4 GW of onshore renewable projects across Europe in a 65/35 joint venture.

TotalEnergies said it will bring to the venture its experience in the construction and operation of large-scale projects, its ability to market the off-take in merchant countries and its financial robustness. European Energy has a proven track record in developing greenfield projects and engaging successfully with stakeholders.

“We are delighted to enter into this agreement with European Energy which has developed a portfolio of assets in merchant countries such as Spain where TotalEnergies is already

active, and which will enable us to accelerate our profitable growth. This cooperation will build on the strength and complementarity of both companies to bring value to these markets where our integrated power strategy makes a lot of sense,” said Vincent Stoquart, Senior Vice President, Renewables at TotalEnergies.

The French oil major said that as part of its ambition to get to net zero by 2050, it is building a portfolio of activities in electricity and renewables. At the end of July 2023, TotalEnergies’ gross renewable electricity generation installed capacity was 19 GW. It plans 35 GW of renewable sources and storage capacity by 2025, and 100 GW by 2030.

UK looks for investors in Sizewell C

The UK government has invited investors to express interest in financing the proposed Sizewell C nuclear power plant, to be built adjacent to Sizewell B on the Suffolk coast. Sizewell B was the last nuclear reactor opened in the UK in 1995.

Companies are invited to complete a pre-qualification assessment, during which they should prove that they meet the key criteria for taking an equity stake in the project. The Sizewell C Company and lead developer EDF are looking for “companies with substantial experience in the delivery of major infrastructure projects”.

Claire Coutinho MP, Secretary of State for Energy Security and Net Zero, said: “We are focused on secur-

ing good value for taxpayers and look forward to seeing strong and competitive bids to be a part of this exciting project.”

Andrew Bowie MP, Minister for Nuclear and Networks, said he expects investors to “bring new expertise and experience” into the company and labelled Sizewell C a “critical piece of national security”.

Meanwhile, Czechia’s state-owned electric utility CEZ has agreed to extend the deadline for submitting the final bids for construction of a new nuclear reactor at Dukovany. The deadline for submitting binding bids has already been extended once but the extensions do not affect the project schedule.



- UK auction failure and comments cause concern
- Wind lobby groups want to see societal value reflected in price

Janet Wood

WindEnergy Europe has welcomed the launch of a new ‘Wind Power Package’ designed to address “a unique set of challenges”, according to European Commission President Ursula von der Leyen.

The lobby groups said the European wind energy supply chain is struggling and although the EU and its Member States have set ambitious targets for 420 GW of wind energy by 2030, “the reality is the wind industry does not reflect this ambition”.

The EU’s plan comes soon after the UK received no bids for offshore wind in its fifth allocation round for renewable energy contracts for difference (CFDs). The industry’s main complaint was that CFD levels have not kept pace with rising costs in building new wind farms.

RenewableUK’s Chief Executive Dan McGrail said: “The government is going to have to outline clear mea-

asures to restore market confidence in the Autumn Statement, not least to ensure that we can compete against the USA, Europe and China for investment at a time when the global race to build new renewable energy projects has never been more intense.” Companies were also concerned by recent statements by UK Prime Minister Rishi Sunak that suggested a retreat on some net zero milestones. Energy UK’s Chief Executive, Emma Pinchbeck said: “Sudden changes to policies and targets like this are damaging to the very investment we need to fund the move towards net zero...”

McGrail said: “We also need to see new incentives focused on investment in manufacturing.” This was echoed in the new statement from Von der Leyen, who said: “The future of our clean tech industry has to be made in Europe.”

The European Commission’s European Wind Power Package aims to:

■ Improve auction systems in Member States

■ Focus on skills, access to finance and stable supply chains.

WindEurope said these were “critical” actions because 80 GW of wind projects are still stuck in bureaucratic processes all around Europe. It stated: “It cannot be stressed enough that without quicker permitting at national level we won’t reach our European targets. Member States have been organising auctions that undermine the health of the European wind supply chain, complaining that some countries even make developers pay to build wind farms... Other countries have failed to factor in inflation in their auction frameworks, leading to undersubscribed auctions.”

It said auctions based on price had “led to a race to the bottom” and other criteria were required to reward the European wind industry’s wide societal value.

Great Britain to see battery capacity grow by a third by 2024

EDF Renewables UK has added to a surge in battery construction in Great Britain that is set to see storage capacity increase from 2.9 GW at the end of June to reach 4 GW by the end of the year.

The company has won planning approval for three new battery sites in

England, totalling over 200 MW. EDF Renewables said the three sites will maintain momentum in its plans to deploy batteries in 40 strategic locations nationwide.

In total, EDF Renewables UK plans to deliver up to 2 GW of transmission-connected battery storage and link

them to electric vehicle charging facilities and solar PV at so-called Energy Superhubs.

EDF Renewables UK already has two 50 MW facilities in operation and two under construction. The new sites will be in Kent, due to be operational by early 2025, and in Norwich and

Essex, which are both expected to begin construction in 2024.

Matthew Boulton, Director of Solar, Storage and Private Wire at EDF Renewables UK commented: “The approval is an active proof-point for the growing momentum behind crucial flexibility technologies to manage the

intermittency of renewables across the UK.

“We are taking an important step towards creating a smarter and more resilient electricity system that will enable the massive transition to renewables that we need as we look to tackle the climate crisis.”

Nuclear initiative calls for tripling of global capacity by 2050

- Nuclear can achieve climate goals and energy security
- World needs 40 GW of new nuclear capacity per year

Nadia Weekes

A 'Net Zero Nuclear' initiative calling for the rapid deployment of nuclear energy capacity was launched at the World Nuclear Symposium in London in early September.

The World Nuclear Association (WNA) and the Emirates Nuclear Energy Corporation (ENEC), with the support of the International Atomic Energy Agency's (IAEA's) Atoms-4NetZero initiative, urged governments, industry leaders and civil society to work together to triple global nuclear capacity by 2050.

Achieving 2050 climate targets while ensuring global energy security would require the worldwide rate of nuclear deployment to average 40 GW per year, the symposium heard. This is more

than six times the rate of deployment achieved over the past decade.

IAEA Director General Rafael Mariano Grossi said that support for nuclear energy was growing as it became clear that it could play a major role in decarbonisation.

"The time for debating is over. Nuclear energy is a critical tool in securing future energy systems that are clean, resilient and secure," said Dr Sama Bilbao y León, Director General of the World Nuclear Association. He added that scaling up nuclear energy capacity would require political will from energy leaders and the rapid mobilisation of the required financing.

Quoting the example of the UAE's Barakah Nuclear Energy Plant, which will generate 40 TWh annually once fully operational, Mohamed Ibrahim

Al Hammadi, Managing Director and Chief Executive Officer of ENEC, said that nuclear energy "can be a modern-day climate solution – delivering a transformational shift in the carbon intensity of power supply".

At the London symposium it was announced that the UK Department for Energy Security and Net Zero would be joining 'Net Zero Nuclear' as the inaugural government partner to collaborate and support the initiative ahead of the COP28 climate summit, to be held in Dubai.

"We have launched a nuclear power revival in the UK, with projects like Hinkley and Sizewell C, but also with Great British Nuclear supporting the latest cutting-edge technologies like small modular reactors," said UK Minister for Nuclear and Networks

Andrew Bowie.

Meanwhile, the 'Nuclear Fuel Report: Global Scenarios for Demand and Supply Availability 2023–2040', published on September 7, increased projections for future nuclear capacity as a result of global efforts to decarbonise energy supplies and heightened political commitment to energy security and sovereignty.

From the current 391 GWe of operable nuclear capacity, the reference scenario projects that nuclear capacity will reach 686 GWe by 2040, with a range of between 486 GWe in the lower scenario and 931 GWe in the upper scenario.

More than 140 reactors could be subject to extended operation in the period to 2040, the report found, with several countries allowing existing plants to

operate for up to 60 years, and up to 80 years in the US.

Together with gigawatt-scale reactors, governments and utilities are showing a strong interest in small modular reactors and micro-reactors, including advanced designs that offer simpler construction and financing.

World reactor requirements for uranium in 2023 are estimated at about 65 650 tU. In the reference scenario, these are expected to rise to 130 000 tU in 2040, with a range of between 87 000 tU in the lower scenario and 184 300 tU in the upper scenario.

There are sufficient uranium resources to meet future needs, according to the report. However, producers are hesitating to invest in new capacity. Additional conversion and enrichment capacities are also likely to be needed.

ADB funding to improve Ethiopia power supply

The African Development Bank (ADB) has approved \$104 million in financing to the Ethiopian government for a transmission project to improve power supply in the east of the country.

A \$52 million grant will come from the African Development Fund and a \$52 million soft loan from Korea's Economic Development Cooperation Fund under the Korea-Africa Energy Investment Framework Agreement.

Batchi Baldeh, the ADB's Director of Power Systems Development, said the project would address load shedding in the region, connect more industries and households to the electricity network, and eliminate the use of diesel generators.

The project will also facilitate the government's regional agricultural irrigation programme, targeting nearly

half a million hectares to tackle the region's food-security challenge and provide adequate fodder for livestock.

The transmission upgrade project will involve the construction of 157 km of 400 kV double-circuit transmission lines and associated substations at Harar, Jijiga and Fafem. It will serve as a take-off point for future power interconnection to Somalia and contribute to the Horn of Africa Regional Initiative to address the drivers of conflict and facilitate trade.

Beyond the benefits for commercial and industrial operators, the project will offer opportunities to 200 students – at least 40 per cent girls – for six-month placements during construction. The initiative will also provide 30 students with grants to attend training courses in the energy sector.

Dubai utility appoints Masdar to construct 1.8 GW solar farm

Dubai Electricity and Water Authority (DEWA) has awarded a contract worth AED5.5 billion (\$1.5 billion) to Abu Dhabi-based Masdar to construct the sixth phase of the 1.8 GW Mohammed bin Rashid Al Maktoum Solar Park.

At least 23 international companies participated in the bidding process. Masdar offered a levelised cost of energy of \$1.621/kWh – the lowest of any of DEWA's solar independent power producer model projects to date.

His Highness Sheikh Mohammed bin Rashid Al Maktoum, Prime Minister of the UAE and Ruler of Dubai,

witnessed the signing of an agreement by Ahmed bin Ahmed Al-Jaber, UAE's Minister of Industry and Advanced Technology, and Saeed Mohammed Al-Tayer, Managing Director and CEO of DEWA.

The sixth phase, which will become operational in stages starting from the fourth quarter of 2024, will increase the solar farm's total capacity to 4660 MW. All phases of the landmark project are to be completed by 2030, with a total investment of AED50 billion and the avoidance of 6.5 million tonnes of carbon emissions per year.

COP28 Presidency announces \$4.5 billion initiative to unlock Africa's clean energy potential

- Africa50 investment platform joins UAE finance initiative
- African governments urged to pave the way for clean energy

Nadia Weekes

The COP28 President-Designate, H.E. Dr. Sultan Al Jaber, has announced a UAE finance initiative that will provide \$4.5 billion to help unlock Africa's clean energy potential.

Launched at the inaugural African Climate Summit in Nairobi, Kenya, the initiative aims to bring together public, private and development capital from UAE institutions, notably Abu Dhabi Fund for Development (ADFD), Etihad Credit Insurance (ECI), Masdar and AMEA Power.

Africa50, an investment platform established by African governments and the Africa Development Bank (AfDB) to solve the continent's infrastructure challenges, has also joined the UAE finance initiative.

Al Jaber has repeatedly called for the global tripling of renewable energy by 2030 and for finance to be more available, accessible and affordable. At the launch, there was also a call to action for African leaders to improve policy and regulatory frameworks to attract long-term investments in energy.

African countries must restore the financial sustainability of local utilities, modernise basic energy infrastructure, clarify development processes and eliminate bureaucratic obstacles delaying market lead-time.

Restrictions to capital flows must be removed and adequate and affordable risk mitigation measures put in place, Al Jaber said, adding that a multi-stakeholder partnership approach would accelerate sustainable economic progress and stimulate low-carbon growth.

Fast-tracking the energy transition, fixing climate finance, focusing on people, lives and livelihoods, and underscoring these efforts with full inclusivity are the key pillars of the COP28 Presidency's agenda.

In sub-Saharan Africa alone, 600 million people have no access to electricity. Investment in African renewables currently represents only 2 per cent of the global total, and is less than a quarter of the \$60 billion per year the continent needs by 2030.

The initiative will sit under the umbrella of Etihad 7, a development platform launched by the UAE at Abu

Dhabi Sustainability Week in 2022 to provide 100 million people across Africa with clean electricity by 2035.

The Abu Dhabi Fund for Development (ADFD) is offering \$1 billion of financial assistance to address basic infrastructure needs, offer innovative finance solutions and mobilise private investment.

The Etihad Credit Insurance (ECI) is providing \$ 500 million of credit insurance to de-risk and unlock private capital.

Masdar, which is targeting as much as 10 GW in new clean energy capacity in Africa by 2030, said it is committing \$2 billion of equity and will mobilise an additional \$8 billion through project finance and its Infinity Power platform.

AMEA Power is targeting 5 GW of renewable energy capacity in the continent by 2030 and mobilising \$5 billion, of which \$1 billion will come from equity and \$4 billion from project finance.

The COP28 Presidency has called for international financial institutions and foundations to join the effort to convert words into actions.

Octopus expansion continues apace

- Investments in wind farms globally
- Agreement signed for purchase of Shell Energy in UK and Germany

Junior Isles

Octopus Energy Group is proceeding with its plans for rapid expansion across Europe and the rest of the world, making several key investments last month.

On September 19th, the generation arm of the UK-based energy company announced its investment in Borssele III & IV, one of continental Europe's largest wind farms. The 732 MW wind farm in the Dutch North Sea is made up of 77 turbines. Its 9.5 MW turbines are the largest in Octopus' portfolio.

Octopus Energy Generation, one of Europe's largest renewables and energy transition investors, acquired the 10 per cent stake in the Borssele wind farm from the seller Partners Group,

a leading global private markets firm acting on behalf of its clients. Octopus acquired the stake on behalf of funds it manages including the Sky fund (ORI SCSp).

Alex Brierley, Co-head of Octopus Energy Generation's fund management team said: "Investing in one of Europe's largest wind farms in the Netherlands is a really exciting milestone as we only entered the Dutch renewables market last year. We've got big ambitions to supercharge the green energy transition globally."

This latest deal comes as Octopus continues to ramp up its global offshore wind activity. Recently it announced plans to unleash \$20 billion (£15 billion) of investment into offshore wind globally. And earlier in

September it invested in Deep Wind Offshore, a global offshore wind developer with projects in Norway, Sweden and South Korea.

All three countries have vast wind resources and strong governmental support for offshore wind. Octopus is aiming to build 10 GW of new offshore wind by 2032, with 2 GW exclusively developed in South Korea.

Deep Wind Offshore was founded in Norway and is backed by leading Norwegian shipping and energy companies Knutsen OAS, Haugaland Kraft, and Sunnhordland Kraftlag.

Since launching in January 2021, the developer has grown rapidly across the globe and entered joint ventures with energy majors like EDF Renewables and bp.

Octopus Energy Generation has green generation projects in 15 countries. It invests in, builds and flexibly manages renewable energy, operating a £6 billion (\$7.3 billion) portfolio of projects – one of Europe's largest.

The Octopus Group has significant businesses in energy retail, generation, technology and electric vehicles and has received well over \$1 billion in investment from global giants, including investment funds, pension funds and large energy companies.

At the start of September its retail arm boosted its customers base with the purchase of Shell Energy UK and Germany. The company signed a deal with Impello Limited ("Shell"), a subsidiary of Shell Petroleum Company Limited, to buy Shell Energy in the

UK and Germany, taking on two million new home energy and broadband customers.

The deal grows Octopus to nearly 6.5 million household customers in the UK (over 11 million meter points). Its customer base in Germany will grow to almost 300 000.

As part of the sale, Shell and Octopus have also agreed to explore what they describe as a "potential international partnership" on electric vehicle charging. Shell wants to develop a global network of around 200 000 public charging points by 2030.

Octopus, in its latest accounts, reported revenues of £3.9 billion (\$4.75 billion) and a pre-tax loss of £180.8 million (\$220.5 million) for the year ending April 2022.



French oil major TotalEnergies has agreed to invest \$300 million into a wind and solar joint venture (JV) with the green energy arm of India's Adani.

It is the first European company to sign a big deal with the Indian conglomerate since Adani was hit with fraud allegations early this year. The investment comes eight months after US-based Hindenburg Research published a report accusing the group of stock manipulation and accounting fraud, an allegation Adani strenuously denied.

"We are delighted to extend our long-term partnership with TotalEnergies" in Adani Green Energy, said Gautam Adani, Adani Group Chair.

TotalEnergies' Chairman and Chief Executive Patrick Pouyanné said the new joint venture would "speed up our development through direct access to a large portfolio of assets".

In a stock exchange filing, Adani said part of the new joint venture agreement was to "modify certain terms" of Total's previous investment in Adani Green Energy Twenty Three, the Adani Green Energy subsidiary they co-own.

TotalEnergies told the *Financial Times*: "This is a joint venture which gives TotalEnergies direct access to ownership of the assets contributed by [Adani Green Energy]. This allows us to pursue our renewable growth in India, according to our strategy."



Trina Solar Co., Ltd. has revealed that its revenue for the first six months of 2023 totalled \$7.13 billion, with the company delivering more than 75 GW of its 210 mm modules in total by the end of June 2023.

Its latest financial report for the first half of 2023 highlights several key milestones. Semi-annual module shipments surpassed 27 GW, with accumulated overall shipments of solar modules now exceeding 150 GW. Deliveries of tracking systems and fixed tilt mounting structures reached 3.3 GW, while shipments of Trina Storage tripled compared to 2022.

The company said its work with n-type TOPCon technology has contributed to the overall success so far

in 2023.

By the end of this year, Trina Solar said that its n-type wafer capacity is forecast to reach 50 GW, module capacity 95 GW and cell production capacity 75 GW, including 40 GW of n-type cells, all of which are equipped with its n-type i-TOPCon Advanced technology.

Gonzalo de la Viña, President EMEA at Trina Solar, said: "Since Trina Solar was founded in 1997 it has delivered PV modules and clean energy to more than 160 countries and regions. Our recent report confirms again the excellent progress made during the first half of 2023 alone. It has already been a fantastic year for innovation, and there is a significant

demand for our industry to lead smart energy solutions across the globe.

"Solar power is at the top of the agenda for most governments, businesses and individuals, as tackling the climate crisis is a matter of urgency and we're committed to working hand-in-hand with everyone to create a net zero future for all. We are already enjoying an outstanding second half of the year, which has seen the beginning of mass production of our Vertex N 700W+ series modules."

Trina Solar has also established an integrated manufacturing layout in its new Vietnam plant, with 6.5 GW wafer, cell and module capacity to provide "seamless delivery" to meet growing international demand.

Record second quarter for European Energy

Denmark-based European Energy A/S has reported continued growth and strong operational financial results in its Q2 2023 report.

In Q2 and H1 the green project developer said it continued its growth trajectory and achieved several record milestones. Financially, Q2 EBITDA and profit before tax both grew by more than 200 per cent, compared to Q2 2022, to €36.1 million and €21.7

million, respectively.

Construction activities continue at a high pace and European Energy's own renewable energy capacity totalled 1.1 GW at the end of the quarter, representing a growth in excess of 100 per cent compared to 2022.

The company produced 457 GWh from its own assets during the quarter, or approximately three times the amount compared with the same

period in 2022.

"We are pleased with the results for Q2 2023. They are a result of a focused effort of connecting more renewable capacity to the grid," said Jens-Peter Zink, Deputy CEO of European Energy.

The report says growth is set to continue. At the end of Q2 2023, the company had 987 MW under construction, with a significant portion ready to be

operational by year-end. At the end of the quarter, projects under development reached 34.2 GW, with projects in the screening phase adding a potential of 25 GW more.

Other Q2 achievements include: a strategic alliance with Norwegian offshore developer Vårgrønn, focusing on offshore wind in the Baltics; inauguration of the Kassø Power-to-X facility's construction in May and

receiving planning permit for Italy's largest solar farm.

During the quarter, European Energy divested a total of 366 MW, predominantly comprising a ready-to-build project in the US. With an expected partial sale of the Kassø Solar Park and the Kassø Power-to-X Plant, the company says it is on track to achieve the expected project sales for the full year.

10 | Tenders, Bids & Contracts

Americas

Vestas wins 126 MW order in USA

Vestas has been awarded a 126 MW order to repower the Downeast Wind project owned by Apex Clean Energy in Maine, USA. The order consists of 30 V150-4.2 MW wind turbines and includes supply, delivery, and commissioning of the turbines, as well as a multi-year service agreement.

Turbine delivery will start in Q2 2024, with commissioning scheduled for Q4 2024.

In addition, Vestas has received a 243 MW order for an undisclosed wind project owned by RWE Clean Energy, also in the USA. The order consists of 54 V163-4.5 MW wind turbines. As before, the order includes supply, delivery, and commissioning of the turbines, as well as a multi-year service agreement. Turbine delivery will start in Q2 2024, with commissioning scheduled for Q4 2024.

Smart solar tracking system for Colombia

TrinaTracker has signed an agreement with Power Construction Corporation of China to supply the Tepuy Solar PV Park in Colombia with 108 MW of smart tracking systems.

The Tepuy Solar PV Park is in Antioquia province in northwest Colombia, and is being developed by Medellin Electric Power Company. PowerChina is carrying out EPC for the plant, including the design, supply, construction, installation and commissioning of the PV power station. TrinaTracker is the exclusive supplier for the project.

TrinaTracker's smart tracking system includes tracker control unit, SuperTrack, and Trina Smart Cloud monitoring platform. The company claims that the system can increase power generation up to 8 per cent compared with that of conventional solar tracking systems.

Wärtsilä signs GAP agreement with OPPD

Wärtsilä has signed a ten-year Guaranteed Asset Performance (GAP) agreement with US utility Omaha Public Power District (OPPD). The agreement is for the 150 MW Standing Bear Lake Station set to commence commercial operation in 2024.

The project is for a solar PV system that will generate 400-600 MW, with balancing natural gas power capacity of 600 MW to ensure reliable, dispatchable power.

The power plant will operate with nine Wärtsilä 18V50DF dual-fuel engines, which can use natural gas or light fuel oil as required. The engines can be converted to run on carbon neutral fuels as they become available.

Wärtsilä will provide site services as well as support through the Wärtsilä Expertise Centre in Houston Texas, enabling remote support, maintenance planning, and predictive maintenance intelligence.

Asia-Pacific

Thai award for AFRY

National Power Supply of Thailand has awarded AFRY a new owner's engineering service assignment for its floating solar PV project expansion. The project is located in Prachinburi, eastern Thailand.

The floating solar PV project is already one of the largest of its kind in the country. With the expansion of an additional 30 MW, it will total

90 MW, with one further expansion still being planned. AFRY has been owner's engineer for the tendering, design and construction of the complete project.

AFRY's obligations under the terms of the contract includes preparation of the tender documents, evaluation of proposals, assistance during contract negotiations, project management, design review, and monitoring of construction and commissioning of the project.

GE Vernova wins China gas turbine order

East Asia Power (Yangjiang) and Beijing Energy International Holding have each ordered two GE 6F.03 gas turbines for their two new cogeneration power plants, both located in Yangjiang City.

Once they are operational in early 2025, the two plants will each deliver heat and up to 480 MW to the grid. They will help boost the city's transition from coal to gas power generation, lowering emissions.

Robert Huang, Director of Industrial Gas Turbine Sales for GE Vernova's Gas Power China, said: "With these two orders, we are continuing to build solid cooperation with the power generation industry in Yangjiang City."

E&M works for Dibang hydropower project

A contract for the electro-mechanical (E&M) works at India's largest hydropower project, the 2880 MW Dibang Multipurpose Project in Arunachal Pradesh, India, has been secured by Bharat Heavy Electricals Limited (BHEL).

The order for the 12 x 240 MW project located in Roing in the Lower Dibang Valley was placed by NHPC.

BHEL's scope of work in the contract includes: design, engineering, manufacture, supply, erection, and commissioning of the electro-mechanical package, including turbines, generators, digital governing systems, static excitation systems, transformers, bus reactors, gas insulated switchgear, outdoor pot yard and switchyard equipment and electrical and mechanical balance-of-plant.

Major equipment for the project will be manufactured at BHEL's plants at Bhopal, Bengaluru, Jhansi, and Rudrapur.

Indian connection contract for Hitachi Energy

Hitachi Energy India Limited (Hitachi Energy) has won a contract from the IPP Ayana Renewable Power to provide a grid connection solution for the upcoming 300 MW solar PV power plant in Bikaner, Rajasthan, India.

Hitachi Energy will provide EPC for the collection of power generated by the plant and transferal into the grid. The project is scheduled to be commissioned in March 2024.

Hitachi Energy and Ayana Renewables are working closely together to co-create an optimised solution that meets the safety, quality, and technical requirements of Solar Energy Corporation of India, the end-user of the renewable plant.

Europe

Firm order for Vestas in Denmark

HOFOR has awarded a firm order to Vestas for six V136-4.5 MW wind turbines for the Bjørnstrup wind park in Midtjylland, Denmark. It includes supply, delivery and commissioning

of the turbines. Upon completion, Vestas will service the wind turbines under a long-term service agreement designed to ensure their optimised performance.

Turbine delivery is scheduled to start in Q4 2024, with commissioning due for completion in Q2 2025.

Boskalis wins Baltica 2 cabling contracts

Boskalis has been awarded contracts by PGE Polska Grupa Energetyczna and Ørsted for the transportation and installation of the export and array cables for the Baltica 2 offshore wind farm in Poland. The contract is valued in excess of €300 million.

The project scope comprises transportation and installation of 107 array cables with a total length of over 150 km, in addition to four 275 kV export cables with a total combined length of nearly 300 km.

In addition to laying the export and array cables, Boskalis will carry out seabed preparation activities, including levelling, pre-trenching, and removal of boulders.

Preparatory works will commence in 2025 and the transport and installation activities are scheduled to start in 2027.

Consortium agreement for first Polish NPP

Westinghouse Electric Company and Bechtel have signed an agreement to partner on the design and construction of Poland's first nuclear power plant at Lubiatowo-Kopalino in Pomerania. The AP1000 reactor is scheduled for commercial operation in 2033.

The consortium is expected to sign an engineering services contract with Polish utility Polskie Elekrownie Jadrowe shortly.

Westinghouse Electric said that the AP1000 is the only operating Generation III+ reactor with fully passive safety systems, modular construction design and the smallest footprint per MW on the market.

David Durham, President for Energy Systems with Westinghouse, said: "The fleet experience we have earned with our advanced, proven AP1000 technology will serve Poland well as it seeks decarbonisation and increased energy security."

Ibereólica orders 60 MW for Spanish wind farms

Ibereólica Renovables has awarded the Nordex Group with an order for 11 N155/5.X wind turbines for two wind farms in Spain. The contract also includes service and maintenance of the turbines for 10 years.

The two wind farms, Aciberos and Padornelo 3, will have a total combined capacity of 60 MW. Delivery and installation are scheduled to start in spring 2024, with commissioning in summer 2024.

The wind turbines are being built in Lubián in the autonomous Spanish region of Castilla y León.

Hitachi Energy to supply UK's longest HVDC link

Hitachi Energy has been selected by SSEN Transmission and National Grid to supply two HVDC converter stations to interconnect the Scottish and English power grids.

Eastern Green Link 2 will consist of two 525 kV bipole VSC converter stations connected by 440 km of subsea cable and 70 km of underground cable, making it the longest HVDC link in the UK. The link will supply 2000 MW.

The new link will help to secure power transmission in northern UK and support the integration of new

renewable electricity generation in Scotland, as part of the UK's Net Zero Strategy.

International

Fluence 100 MW battery order for Australia

Fluence Energy has won an order from Australia's Tilt Renewables to supply a 100 MW/200 MWh battery energy storage project in Victoria, Australia. This is the first stage of the 200 MW/400 MWh Latrobe Valley energy storage project, the first privately-funded energy storage scheme in Australia. The two-phase project is valued at €145.4 million.

The planned energy storage facility will be installed near Morwell in southeastern Victoria. It will be equipped with the Fluence Grid-stack solution and will be built and serviced by Fluence under a 20-year contract.

WATT to install solar plus storage in Nigeria

Airtel has chosen WATT Renewable Corporation to supply 32 MW of installed solar PV and storage across Nigeria. The contract involves solar power and lithium ion battery storage installed across 600 sites.

The work will include the introduction of novel enclosure technology for the balancing systems being installed across the sites, leading to better operating efficiencies.

Oluwole Eweje, CEO of WATT, said: "Working with Airtel offers a brilliant opportunity to deliver renewable energy to the Nigerian telecommunications space, which will be essential to the continued sustainable growth of the sector."

Jenbacher technology for South Africa

INNIO Group has announced that Danone will install Jenbacher technology at its existing power plant in Aderbolt, Boksburg, South Africa. This will allow a wide range of distributed energy resources to be used while ensuring continuity through energy resilience and plant uptime.

Clarke Energy, an authorised distributor for INNIO's Jenbacher engines, will deliver the EPC of the new microgrid facility which will have two Jenbacher J616 containerised engines and a microgrid controller, providing a total capacity of 5 MW.

Dr Olaf Berlien, President and CEO of INNIO Group, said: "Our Jenbacher microgrid solution empowers Danone to become independent from the electricity grid supply. Their investment in our 'Ready for H2' technology will drive site energy efficiency and empower their pathway to net zero."

EDF signs 2 MOUs with Egyptian government

Egypt's Ministry of Electricity and Renewable Energy has signed two MOUs with EDF. The MOUs are to develop electricity distribution networks to improve the level of service, increase efficiency, and reduce energy losses.

In addition, discussions were held regarding cooperation in the fields of new and renewable energy, green hydrogen, pumping and storage projects, particularly with Europe.

Mohamed Shaker, Egypt's Minister of Electricity and Energy, said that EDF would assist in establishing data centres and installing smart meters.



Hydrogen

Hydrogen holds potential, but investors reluctant and costs stymie action

We've convinced ourselves that a transition to hydrogen is essential if we are to save the planet from the ravages of climate change and put the world on a sustainable course. But despite the promises, a lack of government support and rising costs are holding back an energy revolution, according to the International Energy Agency.

Gary Lakes

If investors and entrepreneurs and governments and developers really got down to it, Planet Earth would have electrolyser capacity of 420 GW for hydrogen in operation by the end of this decade, according to the latest edition of the International Energy Agency's (IEA) annual 'Global Hydrogen Review 2023'.

That figure is based on all the announced hydrogen projects being realised by 2030. And, if the planned projects that have reached the stage of final investment decision (FID) or are already under construction are finished, electrolyser capacity would expand from 700 MW in 2022 to 2 GW by the end of this year, the equivalent of 38 million tons, according to the Paris-based agency. Half of that would be in China.

"We have seen incredible momentum behind low-emissions hydrogen projects in recent years, which could have an important role to play in energy-intensive sectors such as chemicals, refining and steel," IEA Executive Director Fatih Birol said in a

statement released with the report on September 22. "But a challenging economic environment will now test the resolve of hydrogen developers and policymakers to follow through on planned projects. Greater progress is needed on technology, regulation and demand creation to ensure low-emissions hydrogen can realise its full potential."

Momentum for low-emissions hydrogen continues to grow, the agency said, but it pointed out that the slow roll-out of financial incentives coupled with cost pressures threatens to delay projects. More than 40 countries have announced national hydrogen strategies, but installed capacity and volumes remain low as developers wait for governmental support before making the investment. This is keeping low-emissions hydrogen at less than 1 per cent of overall hydrogen production and use, according to the IEA.

Furthermore, in the midst of a global energy crisis, high inflation and supply chain disruptions, new projects face rising costs that threaten long-term profitability.

"Inflation and more expensive borrowing costs are affecting the entire hydrogen value chain, driving up financing costs for developers and reducing the impact of government support," the IEA statement said. "This confluence of factors is particularly detrimental for an industry that faces high upfront costs related to equipment manufacturing, construction and installation," it added.

The report also noted that efforts to stimulate demand for low-emissions hydrogen is lagging behind what is needed for climate ambitions. Global hydrogen use amounted to 95 million tons in 2022, up by 3 per cent, but growth in hydrogen usage slumped in Europe during that period due to the sharp increases in the price of natural gas.

The IEA says low-emission hydrogen – produced with electrolysers run with renewable energy – can give countries the opportunity to boost their economies through the creation of new industrial supply chains.

Even though there are a number of existing government funding programmes in the US, Europe and the

UK, there are lengthy time lags between policy announcements and implementation that result in developers delaying their projects, according to the report.

Nearly three-quarters of the 38 million tons of hydrogen that the world could produce in 2030 if all the planned projects were realised would come from the production method using electrolysers running on renewable energy – green hydrogen. The rest would be the result of using fossil fuels, producing blue or grey hydrogen, depending on the fossil fuel used to produce it. These operations would include carbon capture, utilisation and storage (CCUS). While most energy companies are fully backing CCUS, the concept has yet to be shown as an effective way to eliminate carbon from the atmosphere.

The IEA states that the best prospects for low-emissions hydrogen use are in hard-to-abate industrial sectors by replacing hydrogen produced by unabated fossil fuels. But progress in this has been slow.

It added that lack of hydrogen demand creation is illustrated in existing

country commitment, noting that the sum of all government targets for low-emissions hydrogen production accounts for 35 million tonnes currently, but targets for creating demand account for just 14 million tonnes, only half of which is focused on existing hydrogen uses. There is some private sector action on purchase agreements, but this is on a small scale.

The IEA report urges a number of steps for governments to reduce risks and improve the economic conditions for moving ahead with low-emission hydrogen.

It calls for states to urgently implement support schemes for low-emission hydrogen production and use; take bolder action to stimulate demand creation for low-emission hydrogen, particularly in existing hydrogen uses; foster international co-operation to accelerate solutions for hydrogen certification and mutual recognition of certificates; quickly address regulatory barriers, particularly for project licensing and permitting; and support project developers to maintain momentum during the inflationary period and to extend regional reach.

Gas

European gas prices set to fall, while US to see boost in LNG exports

With labour strikes at major LNG facilities in Australia ended, world gas markets have returned to their normally clear state of uncertainty. A new report released by Wood Mackenzie forecasts a drop in European gas prices by next summer, but that could depend on whether the continent sees a mild winter due to the effects of El Niño. In the US, LNG exports are forecast to grow, suggesting that downward pressure on prices could be in the wings.

Gary Lakes

A new 'Short-term report' on the European gas market released by Edinburgh-based Wood Mackenzie in late September predicts a decline in European gas prices by as much as 20 per cent by mid-2024 when compared to the price forward curve.

"Factors including storage reaching as high as 96 per cent levels at the end of October as well as a softening of demand for gas in the power sector, could see prices falling 20 per cent, or \$4 per million British thermal units (MMBtu), by next summer," Wood Mackenzie said.

According to data supplied by the consultancy, demand for gas in Europe is moving into a steady decline. European gas demand amounted to 475 billion cubic metres (bcm) in 2021 and 417 bcm in 2022. Demand is set to reach 399 bcm in 2023, 390 bcm in

2024, and 386 bcm in 2025, according to the company's figures.

From this year to next, demand will decline by 9 bcm, a 2.2 per cent drop year-on-year that will materialise mainly in the power sector. "Gas in power is expected to decline by 12 per cent year-on-year in 2024, a similar decline to that of 2023, caused by an increase in renewable capacity, improved nuclear performance and still relatively weak electricity demand," the report said. "The anticipated rebound in industrial and residential demand will also fail to fully materialise, given challenging economic factors," it added.

Wood Mackenzie said weather will play a key part on how markets will balance. Well-balanced European markets and a downside on prices for 2024 relies on a normal weather assumption for the winter of 2023-24 and summer next year. The report

warns that an extremely cold winter in Europe could bring on an additional demand for 20 bcm and see gas storage levels fall to 26 per cent by March 2024. This could risk Europe failing to achieve its 90 per cent storage target, resulting in substantial upward pressure on prices, the report said.

"However," the report said, "forecasts of an El-Niño year suggest there is now a higher change of a warmer-than-average winter across Asia and Europe, which risks putting further downward pressure on prices."

But by 2025, Wood Mackenzie forecasts that the market will again tighten due to the stoppage of Russian gas transits to Europe through Ukraine as the transit agreement expires.

"The market anticipates a big drop in prices in 2025 on the expectations that more LNG supply will be available," company gas and LNG analyst

Mauro Chavez said in the report. "We think this is overplayed as it will take time for supply to ramp up, while LNG demand in Asia will increase," he said.

Wood Mackenzie sees less LNG availability for Europe in 2025, compared to 2023-24, with storage levels reaching 90 per cent, a level compared with the previous year and one that will press upon prices, according to the report.

Meanwhile, the Bank of America in a recent report echoed the Wood Mackenzie report for gas prices in the US. BoA said that this summer's heatwave in Texas nearly halved the US gas supply, but that a mild winter could push gas stocks up to record levels and result with prices below \$2 per million Btu in the first quarter of next year.

According to the US Energy Information Administration (EIA), US gas production is on track to register at

98.1 (bcf/d) in 2022, rising to 102.7 bcf/d in 2023 and 104 bcf/d in 2024. Those output increases are expected to go to the country's LNG export facilities.

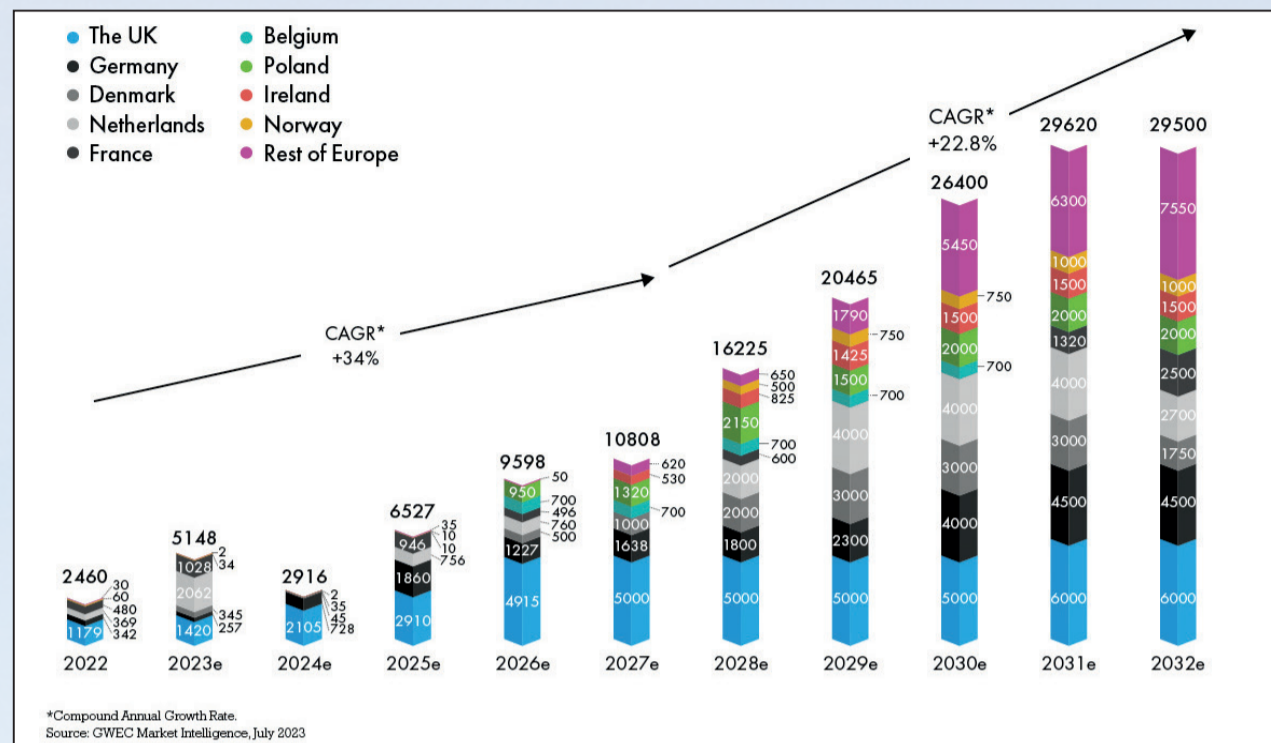
Europe and the UK continue to be the top markets for US LNG exports. Those destinations account for 67 per cent, or 7.7 bcf/d of US deliveries.

In its recent 'Short-Term report', the EIA said the US exported more LNG than any other country during the first six months of 2023. The EIA cited Cedigaz as its source of information. US LNG exports averaged 11.6 bcf/d during the first six months of this year, up 4 per cent year-on-year. Australia came in second with an average of 10.6 bcf/d. Qatar ranked in third place at 10.4 bcf/d.

The EIA forecast that US LNG exports would rise to 11.60 bcf/d in 2023 and 13.15 bcf/d in 2024, up from record output of 10.59 bcf/d in 2022.

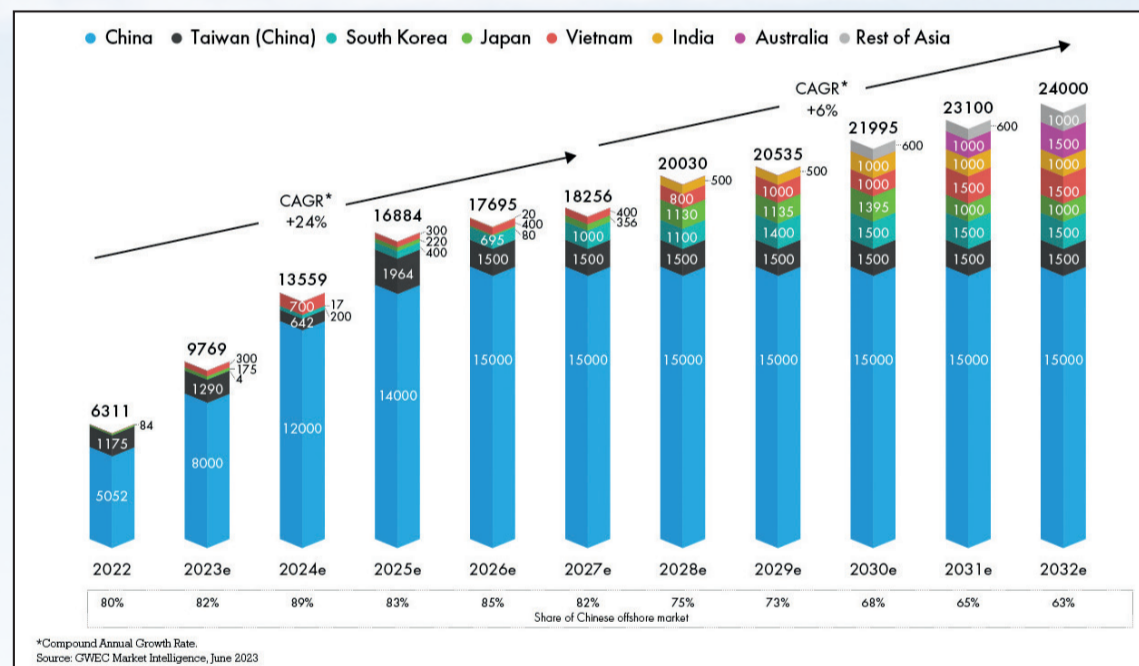
12 | Energy Industry Data

New offshore wind installations, Europe (MW)

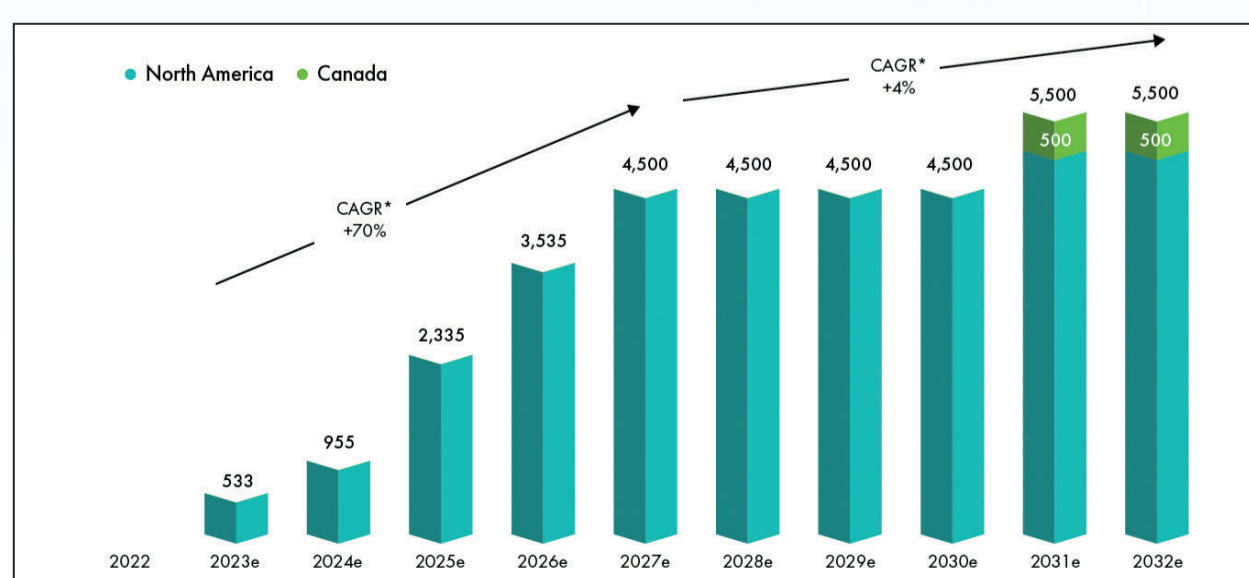


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Offshore wind growth to 2032 in Asia Pacific (MW)



New offshore wind installations, North America (MW)



R&D pathways for dispatchable net zero power and heat solutions

Gas turbines will play a pivotal role in the ongoing energy transition. A recent milestone was reached in the collective effort required to realise the vision of a decarbonised energy system, with the publication of ETN Global's report on the latest research and development in the sector. ETN's **Christer Björkqvist** discusses some of this R&D work as well as pathways for the use of gas turbine systems for power generation and mechanical drive.

Björkqvist: It is imperative to foster an informed and coordinated voice within the gas turbine user community



The global energy landscape is undergoing significant changes, characterised by increasing complexity and volatility. Factors such as disruptions in supply chains, inflationary pressures, and global economic turmoil have posed threats to energy security and affordability. Additionally, the escalating global temperature and the rise in natural disasters across the planet are pressing challenges our society urgently needs to address. Consequently, there is a need to accelerate decarbonisation efforts in line with the 2030 targets and the goal of net zero emissions by 2050.

All of this must be done while ensuring the security of energy supply and promoting energy equity. Various decarbonisation technologies and solutions are under consideration, each with its unique advantages and drawbacks. It is therefore crucial to thoroughly explore future scenarios and pathways in a system approach to define a portfolio of technologies and solutions that can be tailored to overcome the complexity of the energy trilemma.

Increasing the share of renewable energy is the main pathway for decarbonising the energy grid. Recently, the European Parliament voted in favour of raising the share of renewables in the EU's final energy consumption to 42.5 per cent by 2030. But considering the intermittent nature of renewables such as wind and solar, integrating reliable and dispatchable power and heat technologies becomes imperative.

The dispatchability and adaptability to use carbon-free fuels make gas turbines an essential technology in decarbonisation strategies. Gas turbines already offer high efficiency, reliability, operational flexibility, well-established low-emission credentials, and the capability to use hydrogen fuel blends. These attributes offer important decarbonisation opportunities in the energy transition,

and a clear path towards a dispatchable zero-carbon technology suited for a wide variety of applications along with the opportunity of additional efficiency increases through sector coupling. As such, continuous research and innovation efforts in the gas turbine sector are of paramount importance to exploit the full capabilities and potential contributions of turbomachinery technologies in the energy transition and beyond.

The ability to utilise hydrogen/methane blends today and the prospect of using 100 per cent hydrogen and even carbon-negative fuels within the next decade have reshaped the industry. For this purpose, new combustion techniques are under development, e.g., staged combustion and micro-mix combustion. These combustion techniques require significant changes in the architecture of the gas turbine combustion system, and thus need major R&D steps before they can be considered in commercial gas turbine products.

Impressive achievements are already underway, and several full-scale R&D projects are ongoing to demonstrate 100 per cent hydrogen combustion. This evolution not only aligns with carbon reduction goals but also addresses the critical need for energy storage as variable renewable energy sources expand.

The European Commission's commitment through the European REPowerEU programme to make 20 million tonnes of renewable hydrogen available by 2030, is ambitious and holds great potential to kick-start the development of a hydrogen economy also for power generation.

Other alternative fuels that are close in composition and properties to natural gas, such as biofuels/methane and Synthetic Natural Gas (SNG), are also expected to play a key role. These fuels can be derived from sources like waste biomass, or synthesised using surplus renewable energy. The use of biodiesel and biogas has been fully demonstrated in a wide range of gas turbine engines and the development of fuel systems is ongoing to improve fuel flexibility even further. Ammonia is another carbon-free alternative gaining prominence, serving as both an intermediate vector for hydrogen transport and a potential fuel for gas turbines. However, to use ammonia as a gas turbine fuel requires major changes to the fuel and combustion system due to the lower heating value, flame speed and higher nitrogen content. Constant and promising progress is being reported also on this challenge.

Carbon capture, utilisation and storage (CCUS) solutions are also a decarbonisation pathway of importance, especially for industries struggling with "hard-to-abate" emissions, which require additional demonstrations. Following successful feasibility studies, the UK and US are advancing in the Front-End Engineering Design (FEED) phase. During this stage, engineering designs for power stations capable of capturing approximately 95 per cent of carbon dioxide emissions are being developed, with the aim of achieving commercial deployment by 2030.

By using dispatchable gas turbine-

based power generation operating on carbon-neutral or decarbonised fuels, coupled with existing gas infrastructure and seasonal energy storage solutions, the required electricity supply and grid stability can effectively be guaranteed in a sustainable way. This integrated approach paves the way for the seamless large-scale integration of intermittent renewable energy sources.

To fully explore this pathway, increasing the operational flexibility with improved ramp rates and enhanced load-following capabilities becomes crucial, particularly with increased efficiency at part-load.

Integration of energy storage solutions in thermal power plants is another way to increase ramp capabilities and allow operation at nominal maximum and minimum loads while maintaining the possibility of providing ancillary grid services. There are many different schemes that might be integrated, including thermal energy storage, compressed air energy storage, liquified air energy storage, batteries, or power-to-X-to-power schemes.

Such an integrated system would further improve flexible plant operation in peaking mode, increase ramp rate/frequency response and minimise complete machine shutdown, therefore potentially reducing mechanical fatigue. The hybridisation with batteries could provide another advantageous opportunity by replacing traditional black-start engines with electric motors. Hydrogen, supplements batteries allowing for extended storage ranging from days to seasons, making it an ideal complement to intermittent renewables.

R&D efforts are also required to enhance the flexibility of entire power plants, including the bottoming cycle. In this regard, emerging technologies such as Organic Rankine Cycles and CO₂-based cycles with various cycle configurations, aim to replace the classical water-steam bottoming cycle. Testing of subcomponents is currently ongoing.

Micro and small gas turbines are gaining prominence in decentralised energy systems, offering the ability to stabilise low- and mid-voltage power grids while reducing the burden on high-voltage networks. In decentralised systems, there is no need for long-distance energy transportation, as they are using local biomass, renewable energy sources, and locally generated hydrogen. Implementing gas turbines in combined heat and power applications can effectively lower primary energy consumption, covering both the electricity and the heating demand.

While gas turbines ranging from 2 MW to 20 MW are well-established in industrial settings, micro gas turbine (MGT) technology, typically operating within the range of 1 kW to 1 MW and employing the recuperated Brayton cycle, holds promise for decentralised power generation among smaller consumers. Commercial MGTs feature mid-low power-to-heat ratios, making them optimal for heat-driven cogeneration applications. Considering the ongoing electrification trend and the growing demand for decentralised solutions, future MGTs will also need to demonstrate higher efficiency in electricity-

driven applications.

There is a growing need to explore the potential of digitalisation, automation and analytics to enhance the reliability and optimisation of power plant operation and maintenance. Lifetime assessment and extension of critical components to control and mitigate potential effects of increasing starts and stops, cyclic behaviour and the use of alternative fuels are becoming increasingly important.

To further mitigate the risk of material and component fatigue a focus on design developments is essential. Particularly in areas such as flow path optimisation, advanced material selection, and expanded repair options. Furthermore, optimising operations through increased accurate measurements not only reduces fuel consumption but also lowers CO₂ emissions. While these technologies are already available, there is a clear need and opportunities for ongoing improvements.

Emerging additive manufacturing techniques, such as laser metal deposition have opened new possibilities for designing complex 3D burners and combustors. Other 3D printing techniques and new high-temperature materials are also being explored by OEMs, suppliers and operators for the manufacturing and repair of parts. These efforts aim to reduce costs and achieve unique material compositions or structures that are otherwise unattainable through conventional 'subtractive' manufacturing methods. Additionally, the identification and validation of high-temperature alloys using the laser powder bed fusion (LPBF) process are essential steps needed for additive manufacturing of turbine blades.

As global energy markets continue their transformation, gas turbine technology retains its central role, offering adaptability, versatility, and decarbonisation potential, critical to building a resilient and sustainable energy system. To expedite this adaptation, it is imperative to foster an informed and coordinated voice within the gas turbine user community, guiding and stimulating market demand.

To progress towards this, ETN Global, a leading international association representing the entire gas turbine value chain, features dedicated technical Working Groups, led by a Project Board that considers input from the gas turbine user community and aligns with policy targets. The outcomes are common cooperation activities like projects, standardisation, and reports detailing the R&D described and technology roadmaps.

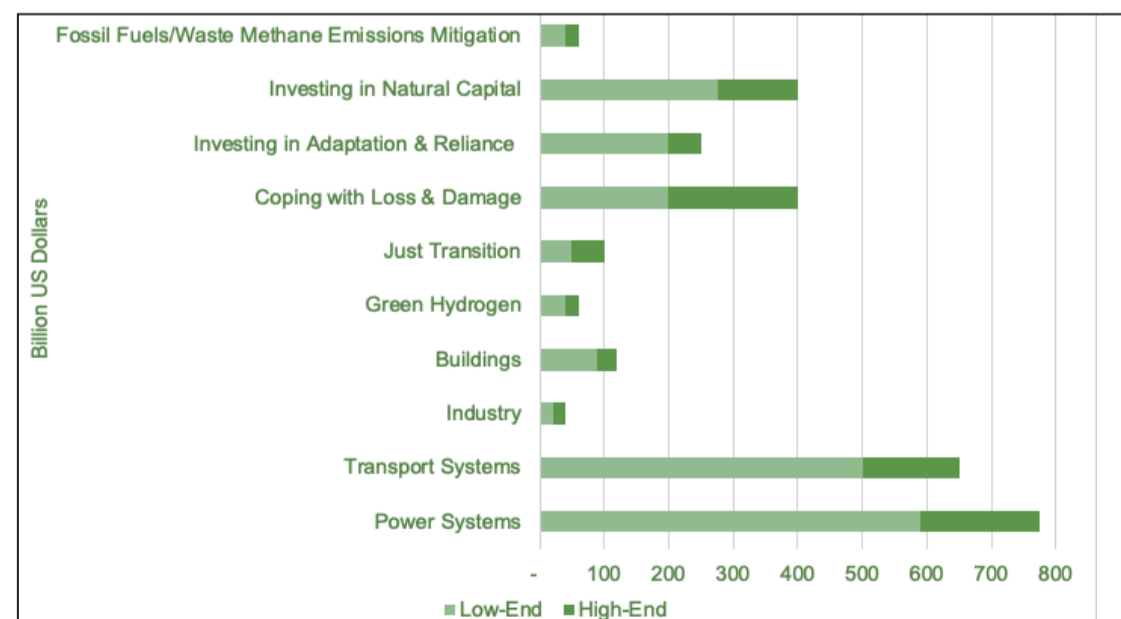
ETN Global plays a pivotal role as a platform for collaboration among the gas turbine users, the research and development community, and technology providers. A key outcome is the identification of a portfolio of solutions, including the most promising development pathways for diverse markets, applications, and geographical locations. Ultimately accelerating the technology transition through a more focused approach.

The R&D report will be made publicly available on ETN's website www.etn.global after the International Gas Turbine Conference 10-11 October 2023.

COP28 may be the most critical yet

COP28 is fast approaching and the headline news is the slow pace of progress and lack of solutions to finance the energy transition. Businesses have identified investment prospects, but the investment window is wider in developed economies than in developing ones. **Joseph Jacobelli** argues this is now changing, primarily thanks to the efforts of the financial and private sectors rather than those of public institutions. This bodes well for the upcoming summit.

External financing sources for investment and spending priorities for climate action and related development goals



Source: Songwe V, 'Finance for Climate Action Scaling up Investment for Climate and Development Report of the Independent High-Level Expert Group on Climate Finance' (Nicholas Stern and Amar Bhattacharya eds, 2022) <<https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2022/11/IHLEG-Finance-for-Climate-Action-1.pdf>> accessed 25 September 2023 (Table simplified by the author)

Another global climate summit is imminent. The 2023 United Nations Climate Change Conference or Conference of the Parties of the UNFCCC (COP28) will be held in Dubai for about 13 days from 30 November. (For insights on recent COPs, see page 14 of the November 2021, December 2021, and October 2022 issues of *TEI Times*).

While all COPs are important, COP28 is a bit special. The discussions will remain highly politicised, and geoeconomics and geopolitical splits in this new multi-polar world will be highlighted. These divisions may be more rancorous than before. Yet many major actors, such as China, the European Union, India, and the United States, do see eye-to-eye on some areas of climate action. They agree that it is needed, and that the energy transition and its financing are central issues that must be resolved. They just cannot agree on the approach and all governments feel the massive pressure on their shoulders from a variety of stakeholders.

On the table at COP28 are several key issues that negotiators will tackle. Some for the first time, and others that were part of previous COPs. Critically, most of these issues have seen some progress and have not remained "stale". The COP28 leadership, headed by Dr Sultan Ahmed Al Jaber, CEO of Abu Dhabi National Oil Company (ADNOC), has stressed that the talks are critical to accelerating climate action.

According to many experts, including UK think tank Chatham House, the first key issue is the global stocktake (GST), a process to review collective climate action progress in achieving the Paris Agreement goals. The GST will illustrate that the world is not on track to meet the Paris Agreement goals, and COP28 must deliver a roadmap to change this.

Other key issues include: (a) operationalising the loss and damage fund, which is aimed at offering financial support to countries most vulnerable to and affected by the effects of climate change; (b) agreeing on a framework for the global goal on adaptation (GGA), which is searching for solutions to boost adaptive capacity, intensify resilience, and lower vulnerability; (c) addressing

the energy transition, which is about reducing energy usage and cutting fossil fuels; and (d) addressing food systems transformation, which revolves around structuring ways to channel funds into food and climate transformation projects in climate-vulnerable jurisdictions.

Of course, climate finance will be central to the negotiations. According to a report by the Independent High-Level Expert Group on Climate Finance (IHLEG), which includes Professor Lord Nicholas Stern, about \$1 trillion of external finance annually will be required by 2030.

It may be worth highlighting the views of the "bears" on COP28. The bearish view, which is not limited to climate change-focused NGOs, is that not only has progress been too slow, but it may actually be impossible to stop global warming appreciably. This is something that scientists believe would be disastrous. In 2021, *The Economist* magazine, among many other voices, stated that "prolonged heatwaves, droughts and extreme weather events could all become increasingly common and severe". This sounds very true today.

Bears would also argue that the lack of solutions to finance the energy transition is preventing the possible massive investments to sharply cut global greenhouse gas emissions. Based on the current state of affairs, it is quite certain that the world is heading for a train wreck.

This is partly because the 'global north' (i.e., the developed countries) has failed the 'global south' (i.e., the developing economies). Its failure to deliver \$100 billion annually by 2020 in climate finance to the global south, despite its commitment at successive COPs, "has eroded trust", states the IHLEG.

The investment needs of the global south to mitigate climate change are insanely massive. Governments in the global north have been slow to provide the needed financial assistance. Arguably, the missing link is a radical rethink of global south climate financing. The IHLEG did underline some of the solutions, including structuring mechanisms to generate investment projects rapidly and at scale, and pushing Multilateral Development Banks (MDBs) to

Country	S&P Rating	Required return from solar project (%)
Germany	AAA	7%
USA	AA+	9%
UAE	AA	10%
Saudi Arabia	A	12%
Chile	A	12%
Morocco	BBB-	15%
India	BBB-	17%
Algeria	B	18%
Oman	BB-	18%
Peru	BBB	20%
Costa Rica	B	21%
Namibia	BB	21%
Ghana	B-	22%
Brazil	BB-	22%
Nigeria	B+	22%
Bolivia	B+	24%
Tanzania	B	24%
Egypt	B	28%
Zambia	CCC-	38%
Argentina	CCC+	52%

Return expectation from solar projects in EMDCs

Source: the Climate Policy Initiative quoted by Songwe V, 'Finance for Climate Action Scaling up Investment for Climate and Development Report of the Independent High-Level Expert Group on Climate Finance' (Nicholas Stern and Amar Bhattacharya eds, 2022) <<https://www.lse.ac.uk/granthaminstitute/wp-content/uploads/2022/11/IHLEG-Finance-for-Climate-Action-1.pdf>> accessed 25 September 2023 (Table simplified by the author)

step up their engagements. Another needed action is to restructure the way multilateral international financial institutions supply their financing, especially since part of their work to de-risk investments has proven to be too limited, too bureaucratic, and too slow.

There also seem to be many regional and global initiatives. Many initiatives overlap and be confusing. To list a few: the Science Based Targets Initiative (SBTi), the Glasgow Financial Alliance for Net-Zero (GFANZ), Finance to Accelerate the Sustainable Transition-Infrastructure (Fast Infra), the Voluntary Carbon Markets Integrity Initiative (VCMI), Race to Zero, Climate Action 100+, the Climate Finance Leadership Initiative (CFLI), the Global Investors for Sustainable Development (GISD), the Global Infrastructure Facility (GIF), and the Sustainable Markets Initiative (details on each are available in the IHLEG report). Finally, there should be better global coordination to attract private capital, including more aligned public-private investment programmes.

The positive news is that non-public financial institutions have the capability and the capacity to react and move speedily. Governments are keenly aware of this as well as all of the aforementioned problems. In the coming few years, and perhaps as early as COP28, authorities will be able to construct better platforms and initiatives which may be nimbler, and which may be able to increase the speed of change.

The windows of investment opportunity in climate action and related development goals are vast. The financing required to transform the energy system will need \$1.29-1.745 trillion by 2030, states the IHLEG. About 82-84 per cent of this would go towards power and transportation systems.

This would include zero-carbon generation, transmission and distribution, storage and backup capacity, an early phase-out of coal, as well as low-emission transport infrastructure

and the electrification of fleets or switch to hydrogen. Another \$715 billion to \$1.11 trillion of capital would go towards coping with loss and damage, investing in adaptation and resilience, investing in natural capital, and mitigating methane emissions from fossil fuels and waste.

As governments, financial institutions, corporations, and others seek mechanisms to attract capital in these areas, especially for the global South, the top priority for all is to facilitate investments in higher-risk jurisdictions where investors require a higher return on investment to mitigate the risk.

One pertinent example provided by the Climate Policy Initiative is the required return from solar projects in different countries. For example, an investment in a German solar project would require a return of about 7 per cent, compared to 15 per cent for a similar investment in Morocco, 22 per cent in Bolivia, 38 per cent in Zambia, and 52 per cent in Argentina.

What are the pre-COP28 conclusions? Governments are keenly aware of the slow pace of implementing climate action mitigation policies in accordance with the Paris Agreement. Financial institutions, both public and private, are keenly aware that solutions to finance the energy transition, especially in the global south, have been lacking. The investment opportunities for corporations, financial institutions, and others are in the trillions of dollars by 2030, and this number will grow exponentially after 2030. The clearly stated awareness and pressure from a variety of stakeholders to successfully implement change mean that there is a good chance of positive progress at COP28.

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Power-to-X: Getting the right dynamics

The ability to adjust production of 'power-to-X' plants in line with the availability of wind and solar is a significant development for a technology that is crucial to the energy transition. ABB talks to **Junior Isles** about the world's first power-to-ammonia plant designed to operate in highly dynamic mode.

The green transition requires efficient storage of variable renewable energy, i.e. wind and solar, to which end a number of power-to-X (PtX) plants are under construction. These plants are designed to convert green electricity to another form of energy, such as green fuels. However, their ability to adapt to fluctuations in renewable production has been a drawback.

Now, a plant under construction in Lemvig, near the village of Ramme in West Jutland, Denmark, is looking to change all of that. What is claimed to be the world's first dynamic PtA plant is being built by project developer Skovgaard Energy, Topsøe who will design and supply the technology for the ammonia synthesis and wind turbine manufacturer Vestas, as partners in collaboration with ABB. The project has received approximately \$12 million from the Danish government's Energy Technology Development and Demonstration Programme (EUDP), which funds work by enterprises and universities

Petersen: One of the major unknowns is how to operate in an environment that fluctuates in terms of when you get electricity



Granström: What we are doing right now, is exploring the opportunities in PtX and driving projects to be commercial



to demonstrate new green energy technologies.

The demonstration facility will see existing wind turbines with a total output of 12 MW and 50 MW of new solar panels powering 10 MW of electrolyser capacity to produce 5000 tons of ammonia a year.

Martin Bruhn Petersen, Head of Sales, ABB Energy Industries Denmark, commented: "One of the major unknowns when you talk about hydrogen and green fuels, is how do you operate in an environment that fluctuates in terms of when you get the electricity. So the whole idea is how do you operate the process of making hydrogen and combining it with nitrogen to make ammonia when you can only get electricity when the sun is shining and the wind is blowing, and when it makes economical sense because the plant is not connected to the grid?"

"This is the main difference between this and other [PtX] projects – the plant is not connected to the grid. When the grid does not need the electricity from the wind plant, they use it to make hydrogen and ammonia. So this is a government-supported test facility to see how these assets operate in those difficult situations."

Operating an asset to its limits in an era where electricity will fluctuate in terms of both supply and price will be key going forward. ABB was therefore brought in at the very early stage of trying to understand what this means for a project and provide support on the electrical studies.

Petersen explained: "Whenever you adjust the plant's operation, it will cause some noise on the grid but the operator has to stay within the limits specified by the grid operator. We were also brought in to look at the balance-of-plant from an electrical, instrumentation and control point of view – that's everything from the electricity coming into the process to making the ammonia. The complete process has to be operated in the most efficient way and within the operating limits of the assets."

From an operator's viewpoint, he explains that the challenge will be in understanding the market and know-

ing when to produce. Here ABB, together with the end customer, is looking into digital solutions to handle this.

Comparing this dynamic PtA plant with a conventional installation, Petersen says the current challenge is understanding the limits of the process and assets.

"The whole process is mainly handled by Topsøe, so we needed to enter into a dialogue with them to, for example, understand the limits of the electrolyser – how fast it can ramp up and down, etc. This is the complicated part," said Petersen. "If there is a scenario at night when there is no wind, you need to operate it in a special way. So you really need to understand how the assets and the process work together to avoid damaging the assets while producing the most amount of ammonia."

He added: "If there's no electricity for the electrolyser, you cannot have a situation where the whole process shuts down from one moment to the other. So you have to consider what buffers you need – is a hydrogen storage facility needed? And how big does it need to be? Do you need storage for ammonia? All of this needs to be considered early on so you have that buffer to avoid damaging the asset."

One of the first things that has to be studied, he says, is the integration with the grid. Even if an operator has a grid connection and power is available from the grid, there are a number of issues around regulation and tariffs that will determine if there is a business case. Another element he said, which is a consideration in Sweden and Denmark, is whether district heating is involved.

Petersen noted: "If you can get surplus heat from the process, this influences the business case. At a very early stage with Skovgaard for example, we looked at costs of integrating with the district heating system. For every PtX project that's close to a district heating network, or district cooling, there's an opportunity to change the business case."

The Lemvig project is currently in the detailed design phase. Major equipment has been ordered, and it

is expected to begin operation during the first half of 2024.

The project is one of a growing number of facilities where ABB is taking on the important role of designing and delivering the control and automation systems for optimising the operation of PtX facilities. In May this year it announced its collaboration with Lhyfe and Skyborn to jointly realise and optimise SouthH2Port, one of Europe's most ambitious renewable hydrogen projects.

The new hydrogen production plant, operated by Lhyfe and Skyborn, will be located in the municipality of Söderhamn, Sweden, and connected to Skyborn's 1 GW offshore wind farm in nearby Storgården. When fully operational, it is expected to produce about 240 t of hydrogen per day, with an installed capacity of 600 MW, making it one of the largest suppliers of renewable hydrogen in Europe.

Johan Granström, Head of Energy Transition, ABB Energy Industries Sweden, commented: "ABB has come in as an enabler with critical expertise in automation, digital and electrical, which is the essential part to make a competitive plant. What we are doing right now, is exploring the opportunities in PtX and driving projects to be commercial because in the end it's all about the business case."

He added: "We are also looking at how these projects can support grid balancing in terms of both power and frequency. It's all about how we can create more efficient, reliable and cost-effective eco systems of energy, because there will be a number of different energy carriers that we will manage in the same complex landscape."

No doubt interest in such PtX plants will continue as renewable energy sources continue their rapid rise to becoming the prevailing energy source of the future. Installations that can produce green fuels when the sun shines and the wind blows but also can gear production down when neither energy source is present will be key to a fully integrated and optimised energy system.



Junior Isles

Who's worried about the 'new IRA'?

What a difference a year makes. A little more than 12 months ago, the EU was widely seen as the global leader in driving efforts on clean energy technology and climate change. The US' Inflation Reduction Act (IRA) signed into law in August 2022 has gone some way to shifting the balance, but how much of an impact has it had?

A key pillar of the Act, aimed at curbing inflation, is government incentives to the tune of \$369 billion for energy and climate-related programmes, including: tax credits, research loans, and grants to increase domestic manufacturing capacity for wind turbines, solar panels, batteries, electric vehicle and other essential components of clean energy production and storage.

Last month during a webinar, 'US NEO: The Impact of the Inflation Reduction Act', BloombergNEF (BNEF) presented its view on the Act in terms of what the results so far mean for the US and where emissions are likely to go by 2050.

Under its Policy Scenario – a scenario that “reasonably captures the impact of subsidies in the IRA” – the US gets to about 55 per cent less emissions by 2050 compared to 2021. This means about 45 per cent of emissions from the energy sector need to be eliminated.

Tara Narayanan, Senior Associate, US Power at BloombergNEF, commented: “... It's kind of like looking at a picture of a glass [of water]: it's either half full or half empty depending on how you look at it. On one hand, we have cause for optimism – that represents the technology sectors that

are actually showing promise today and are likely to bring down emissions significantly by 2050. They still require scale-up but this is where the transition is already underway. At the same time there are several sectors that still require a substantial amount of investment focus as well as regulatory effort.”

Going forward, clean power and electrification will be the two main drivers for carbon abatement. “We expect a lot of wind and solar capacity to be added by 2050 along with a rapid retirement of coal – the least cost economics between these generating technologies results in less coal, and the system relies more on gas and renewables,” said Narayanan.

She also noted that the Policy Scenario, tax credits make carbon capture and storage (CCS) much more competitive compared to unabated gas. This was highlighted as “a major standout” of the outlook scenarios. “... much of the capacity that's added to replace coal could come from gas with CCS,” said Narayanan.

According to BNEF, the cost of building and operating capture equipment at gas plants is offset by tax credits enough to start undercutting unabated plants by 2028. “This,” said Narayanan, “is substantial for power [sector] decarbonisation, since in our economics-based scenarios we reach a level of stability in terms of how much renewables can be added”.

Assessing electrification, the other main carbon abatement driver in addition to clean power, BNEF noted that everything cannot be electrified. This is especially true in the industrial sector, and this is where carbon

capture and storage (CCS) will have the greatest impact.

Julia Attwood, Industrial Decarbonisation Specialist at BloombergNEF, said: “Electrifying industrial processes is actually very difficult... in a lot of cases, you might want to use CCS instead of trying start from scratch with the process and electrifying the process. You also have cases, such as in cement and steel and parts of petrochemicals, where you actually need something to provide a chemical input. For example you need a reducing agent in steel. This is why hydrogen and CCS have such an important role to play in industry decarbonisation.”

Notably, CCS plays a much larger role than hydrogen in BNEF's modelling. Attwood explained: “The reason for this, is that the US is pretty well set up for carbon capture, especially compared to its peers in Europe, and even in Australia. The US already has some existing transport and storage infrastructure – mostly from oil companies using CO₂ for enhanced oil recovery (EOR) and then storing that CO₂ afterwards. Having that infrastructure is a massive advantage that really hopes to lower costs of CCS in the US... there is also more experience with CCS in the US and that is why we see some of the lowest costs in the world.”

This means the credits from the IRA can really have a positive impact on how much CCS is built across the nation. The IRA credits look extremely generous. “We're going from \$35-50/ton of CO₂ at point source to \$60-85,” said Attwood. “If you're storing your CO₂, you're getting \$85/t; if you're using it for something else,

like EOR or to make other fuels, you're getting \$60/t. And there's even higher credit for direct air capture DAC.”

But although this looks generous, she concedes it is not quite enough for power in some cases, and for some industrial applications. This is largely due to the fact that these credits run for 12 years and not over the typical 25-year lifetime of a plant.

Derrick Flakoll, Policy Expert for US and Canada at BloombergNEF added that the story of CCS illustrates the point that “even the strong incentives of the IRA are not enough to get us to net zero without mandates and regulations”.

“The carbon capture incentives in the Policy Scenario drive earlier, faster and initially higher adoption of carbon capture in the power sector – and even in our Net Zero Scenario,” he said. “And yet the incentives barely make a dent in the emissions and carbon capture adoption for industry. To reach the goals in the Net Zero Scenario, we need a set of regulations and mandates to require that industry adopts the technologies. You would also need incentives that ensure that those CCS technologies are reliable and operate at high efficiency.”

So although the IRA has done much, and looks set to have a notable impact for the US, it does not mean job done.

When it was first launched, the IRA was a source of real concern to the EU over fears that it would see the flight of investment in clean tech manufacturing from the bloc to a more lucrative haven across the Atlantic. One year on, those concerns seem to have subsided.

A recent joint statement from the French Council of Economic Analysis, the Franco-German Council of Economic Experts and German Council of Economic Experts claims that the EU's green industrial policy is “clearly a superior approach” and that “the IRA is likely to have relatively small effects on US production and production shifts to the United States”.

Their confidence appears justified. The EU's Green Industrial Deal, relaxing state aid rules and putting forward proposals like the Net Zero Industry Act seem to be working. Research conducted by *Politico* across six technologies – wind, solar, batteries, electrolyzers, heat pumps and hydrogen – found that with the notable exception of batteries, concerns were largely unfounded.

Of course, we are only into the first year of these new clean energy incentive policies and much will depend on how easy the different approaches are to navigate, as well as how governments continue to support the decarbonisation effort.

Once upon a time the acronym 'IRA' would immediately conjure up images of explosion and terrorism, especially in the UK. Today, it is a different story. The IRA has not turned out to be the bombshell many had been predicting; at least not yet.

But perhaps the EU, UK and the rest of the world should not be overly concerned anyway. In any event they do have an American-made secret weapon – Donald Trump. Clean energy was hardly top of his agenda during his term in office. If he is re-elected next year, there is always a chance much of the work done to advance clean energy investment in the US could be undone in one fell swoop.

