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Driving greenhouse gas emissions from the world's energy sector to net zero and limiting global warming to 1.5°C remains possible due to the record growth of key clean energy technologies. *Page 8*

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Energy world to "change significantly" by 2030, says IEA

Laura Cozzi, the IEA's Director of Sustainability, identifies "key structural shifts"



The world's energy system will look very different from today in just seven years, according to the International Energy Agency's latest World Energy Outlook. Nevertheless, the ongoing shift to clean energy is still not sufficient to cap the global temperature rise at 1.5°C under the current governments policies scenario. **Junior Isles**

The energy world is set to change significantly by 2030, based on today's policy settings alone, according to the International Energy Agency's 'World Energy Outlook (WEO) 2023'.

The latest edition of the Paris-based agency's flagship publication describes an energy system in 2030 that includes almost 10 times as many electric cars on the road worldwide; solar PV generating more electricity than the entire US power system does currently; renewables' share of the global electricity mix nearing 50 per cent, up from around 30 per cent today; heat pumps and other electric heating systems outselling fossil fuel boilers globally; and three times as

much investment going into new offshore wind projects than into new coal and gas fired power plants, says the IEA.

During the report's launch, Laura Cozzi, the IEA's Director of Sustainability, Technology and Outlooks, and one of the lead authors of the WEO, said: "We identify some key structural shifts that will make us live in 2030 in a very different world than today... importantly, up until now we have been describing the clean energy transition as a type of transformation or another addition. But this decade it will shift from an addition to a substitution. You will see more electric cars and less conventional vehicles. This

will have huge implications for oil markets. The shift from fossil fuels to renewables will be a common thing across many sectors.

"The power sector is the frontrunner. We've seen solar breaking records again and again and the turnaround is happening this decade – clean energy technologies will account for the largest part of generation globally."

All of the IEA's increased clean technology projections are based on the current policy settings of governments around the world but if countries deliver on their national energy and climate pledges on time and in full, clean energy progress would move even faster, says the report.

Renewables are set to contribute 80 per cent of new power generation capacity to 2030 under current policy settings, with solar alone accounting for more than half of this expansion. However, this scenario takes into account only a fraction of solar's potential, according to the WEO analysis. By the end of the decade, the world is set to have manufacturing capacity for more than 1200 GW of solar panels per year, but it is projected to actually deploy only 500 GW in 2030. If the world were to reach deployment of 800 GW of new solar PV capacity by the end of the decade, it would lead to a further 20 per cent reduction in coal

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Renewables still not replacing fossil fuels, says DNV

Although global electric vehicles sales, solar and battery installations hit record highs in 2022, renewables are only partly meeting growing energy demand rather than replacing fossil fuels in the energy mix, according to a new report by DNV.

Renewables are still just meeting increased demand rather than replacing fossil fuels and in absolute terms fossil fuel supply is still growing.

In the seventh edition of its 'Energy Transition Outlook', DNV says that renewables are still just meeting increased demand rather than replacing fossil fuels and in absolute terms fossil fuel supply is still growing.

The report finds that despite a rapid build-out between 2017-2022, renewables met 51 per cent of new energy demand. It also said that limiting

global warming to 1.5°C warming is less likely than ever, and in order to reach the goals of the Paris Climate Agreement, CO₂ emissions would need to halve by 2030. DNV forecasts that this will not even happen by 2050.

"Globally, the energy transition has not started, if, by transition, we mean that clean energy replaces fossil energy in absolute terms," said Remi Eriksen, Group President and CEO of DNV. "Clearly, the energy transition has begun at a sector, national, and community level, but globally, record emissions from fossil energy are on course to move even higher next year."

From now, says the report, most energy additions are wind and solar, which grow 9-fold and 13-fold,

respectively, between 2022 and 2050. Electricity production will more than double between now and 2050, bringing efficiencies to the energy system. The fossil to non-fossil split of the energy mix is currently 80/20 but this will move to a 48/52 split by mid-century.

Solar installations reached a record 250 GW in 2022. Wind power will deliver 7 per cent of global grid-connected electricity and installed capacity will double by 2030, despite inflationary and supply chain headwinds.

"There are short term set-backs due to increasing interest rates, supply chain challenges, and energy trade shifts due to the war in Ukraine, but the long-term trend for the energy transition remains clear: the world

energy system will move from an energy mix that is 80 per cent fossil based to one that is about 50 per cent non-fossil based in the space of a single generation," said Eriksen.

According to a study published by environmental think-tank Ember at the start of last month, wind and solar energy are the only sources experiencing growth globally, acquiring more share of the energy infrastructure and helping power sector emissions remain steady in the first half of 2023.

In the EU in its report for the period from July 1 to September 30 this year, EnAppySys said renewable power generation in the third quarter increased by 12 per cent compared to Q3 2022, marking the highest growth rate for any third quarter so far.

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fired power generation in China in 2030 compared with a scenario based on today's policy settings. Electricity generation from coal and natural gas across Latin America, Africa, Southeast Asia and the Middle East would be a quarter lower.

The WEO also shows that the share of fossil fuels in global energy supply, which has been stuck for decades at around 80 per cent, declines to 73 per cent by 2030, with global energy-related carbon dioxide (CO₂) emissions peaking by 2025.

However, even stronger measures would still be needed to keep alive the goal of limiting global warming to 1.5 °C. A separate report from the US Energy Information Administration (EIA) noted that non-fossil fuel-based resources, including nuclear and renewable energy, will produce more energy through 2050, but that growth will likely not be sufficient to reduce global energy-related CO₂ emissions under current laws and regulations.

"Every country needs to find its own pathway, but international co-operation is crucial for accelerating clean energy transitions," said IEA Executive Director Fatih Birol. "In particular, the speed at which emissions decline will hinge in large part on our ability to finance sustainable solutions to meet rising energy demand from the world's fast growing economies. This all points to the vital importance of redoubling collaboration and cooperation, not retreating from them."

WEO 2023 proposes a global strategy for getting the world on track by 2030 that consists of five key pillars, which can also provide the basis for a successful COP28 climate change conference. They



Birol says the world must not "retreat" from collaboration and cooperation

are: tripling global renewable capacity; doubling the rate of energy efficiency improvements; slashing methane emissions from fossil fuel operations by 75 per cent; innovative, large-scale financing mechanisms to triple clean energy investments in emerging and developing economies; and measures to ensure an orderly decline in the use of fossil fuels, including an end to new approvals of unabated coal fired power plants.

The WEO 2023 considers in detail a major variable for energy markets in the coming years. China, which has an outsize influence on global energy trends, is undergoing a major shift as its economy slows and undergoes structural changes.

Notably, China's total energy demand is set to peak around the middle of this decade, the report projects, with continued dynamic growth in clean energy putting the country's fossil fuel demand and emissions into decline. As the largest energy consumer in the world, the country's transformation will "ripple through the entire energy system", according to the IEA.

Fossil fuel phase-out will be major stumbling block at COP28

- Russia says it will oppose calls for fossil fuel phase-out
- Oil and gas companies urged to invest in decarbonisation

Junior Isles

Resistance from some of the leading oil, gas and coal producers could undermine chances of reaching a new climate pact at the upcoming UN COP28 climate summit in Dubai.

Already Russia has warned it will oppose a global deal to reduce the use of fossil fuels, as tensions rise with western powers following Moscow's invasion of Ukraine.

In a submission to the UN's climate body last month, Russia said: "We oppose any provisions or outcomes that somehow discriminate or call for phase-out of any specific energy source or fossil fuel type."

Russia's position is in clear contrast to that of the US, which says unabated emissions from fossil fuels need to be rapidly reduced to achieve a net zero energy system by 2050.

More than 180 countries and other global bodies are setting out their views as they prepare to undertake tough negotiations ahead of COP28, with the submissions compiled by the UN in a "blueprint" report published in October. Already more than 80

countries backed a proposal at COP27 in Egypt last year to phase-out fossil fuels.

The UN's report also exposed an emerging clash between wealthy and developing countries. Many developed countries, where greenhouse gas emissions peaked decades ago, have set a target to reach net zero emissions by 2050. This is the same timeframe as many developing countries, where funding to finance the green transition is more difficult to access.

Simon Stiell, UN climate chief, said there was "divergence" among countries over "who should carry the weightier burden in terms of action" to limit warming. But Stiell said the report was clear that the world was "off-track to achieving the goals of the Paris Agreement".

The so-called stock-take, which will be agreed at COP28, will look at actions countries have taken since the 2015 Paris Agreement and what still needs to be done in order to tackle global warming.

The blueprint report said some countries wanted the COP28 stock-take to acknowledge that the rich nations'

commitments were "grossly lacking in ambition".

Dan Jørgensen, Denmark's Minister for global climate policy, who is one of two politicians leading discussions with other countries on the stock-take, said countries would have to agree a "broad compromise" on a host of topics at COP28, including how to mitigate climate change, how to adapt economies for the impact of global warming and how to finance the green transition.

"There's a momentum that this will be the most important COP since Paris," he said. "Not only is this where we take stock and look each other in the eyes and say, 'OK, so where are we and where are the gaps between action and ambition?' Also, we need to look forward. What are we to do now to close these gaps?"

Oil and gas companies have a key role to play in closing that gap. Sultan al-Jaber, President-designate of this year's UN climate summit, said he is in talks with fossil fuel producers about an initiative focused on cutting greenhouse gas emissions. This is due to be launched at COP28.

More than 20 fossil fuel-intensive companies, encompassing up to a quarter of all oil and gas production, are in active talks to sign up to the initiative already, he said.

Jaber – who is also head of the Abu Dhabi National Oil Company, one of the world's biggest oil and gas groups – said: "I don't want this industry to be seen in any way, form or shape that they are going against the phase-down [of fossil fuels]. This [phase-down] is happening. "And what they need to do is start investing in the decarbonisation of the current energy system."

Jaber also recently hit out at rich countries for failing to support the UN's Green Climate Fund (GCF), the world's largest fund dedicated to tackling climate change in developing countries. The fund pulled in a total of \$9.3 billion from 25 countries by the close of its one-day pledging conference held in Bonn, Germany, last month. Notably, the US failed to pledge money.

He said the GCF's "current level of replenishment" was "neither ambitious nor adequate to meet the challenge the world faces".

EU countries break deadlock on power market reform

EU energy ministers have struck a deal to reform power market subsidies, ending a stand-off between France and Germany over the future competitiveness of industrial sectors.

The deal focused on a section of the law spelling out how state aid can be used to support power projects. Talks had stalled for months because of concerns, especially from Germany, that the scheme could distort competition and favour France, which has the world's second biggest nuclear fleet after the US.

Last month Germany gave way, agreeing to a deal that allows France to use government support to finance its largely state-owned nuclear plants, which generate about 70 per cent of its electricity.

The proposal had also been strongly opposed by Austria and Luxembourg, which have both been historically opposed to nuclear power but also feared that allowing Paris to subsidise its nuclear plants would provide French industry with structurally lower energy prices, giving it a competitive advantage.

As part of the new EU rules for the bloc's electricity market, France will be allowed to use contracts-for-difference (CfDs) to finance new nuclear build. These CfDs set a minimum price guarantee for power providers, as well as a ceiling above which the state can recover any revenue.

Paris, however, did not obtain a further concession, for the EU to allow revenues from those schemes applied

to existing power plants to be refunded to industrial consumers. The agreement also gives greater power to the European Commission to assess state aid benefits.

Agnès Pannier-Runacher, the French Energy Minister, said that the agreement was "a compromise which sets out a balance" that "allows member states to have room for manoeuvre and take action on the basis of their own energy mix".

The reform aims to steady long-term electricity markets by boosting the market for power purchase agreements (PPAs) generalising two-way CfDs and improving the liquidity of the forward market.

Two-way CfDs would apply to investments in new power generating

facilities based on wind energy, solar energy, geothermal energy, hydro-power without reservoir and nuclear energy. This would provide predictability and certainty.

Germany's Environment and Economy Minister Robert Habeck said in a statement: "Despite great stress, we managed to do it together. With the new electricity market design... consumers in particular will benefit from the cheap production costs of non-fossil fuel energies. This is also important to ensure the transition to competitive prices in Europe."

Germany, Europe's biggest economy, is on the edge of a recession after losing access to the ample supply of cheap Russian gas it received before Moscow invaded Ukraine last year.

Europe will rely on US gas for decades

Europe will rely on US gas for decades as it winds down its dependence on Russian gas and accelerates the shift to renewables in an effort to improve energy security.

Ditte Juul Jørgensen, Director-General for energy in the European Commission told the *Financial Times* that the EU "has the instruments" it needs to endure another winter energy crisis in the aftermath of the Russia-Ukraine war. These included conservation and more renewable energy.

She said, however, that the bloc's reliance on exports of US liquefied natural gas would persist. "We will

need some fossil molecules in the system over the coming couple of decades. And in that context, there will be a need for American energy," said Jørgensen.

After Russia's of Ukraine, the EU struck a pact with the Biden administration to work towards securing an additional 50 million m³ a year of US LNG until at least 2030. The agreement was made on the basis that it was consistent with EU and US climate goals and both parties would work towards reducing gas demand.

Several EU governments came under fire for what many saw as it sleep-

walking into an over-reliance on Russian pipeline gas.

Last month Angela Merkel's former chief economic adviser acknowledged that her policies left Germany overly dependent on Russian gas, and in hindsight the country should have done much more to diversify its energy supply.

"If we'd known then what we know now, we would of course have acted differently," Lars-Hendrik Röller told the *FT*.

But he insisted that cheap, abundant Russian energy exports had delivered a huge boost to Germany's economy,

helping to ensure 10 consecutive years of growth.

"It helped to deliver us strong growth rates that paid for things we otherwise wouldn't have had, for a period of 10-15 years, things which would otherwise not have been possible," he said.

Röller also insisted that Merkel, who served as Chancellor from 2005 to 2021, had little choice but to bet big on Russian gas after deciding to phase-out nuclear energy. "You can argue whether that was the right thing to do, but it was the consensus in society at the time," he said.



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California legislature signs off measures to bring forward offshore generation

- Offshore wind permitting timetable to be reduced by half a decade
- State to investigate potential for wave and tidal

Janet Wood

California's Governor Gavin Newsom has signed new State legislation that will speed up deployment of offshore wind and begin feasibility work on wave and tidal energy. This comes after the State Legislature set 2045 as its target for a 100 per cent renewable and zero-carbon power grid. The state wants to be 90 per cent zero carbon by 2035.

Coming into effect on January 1, 2024, the Offshore Wind Expediting Act aims to put the state's offshore

wind deployment on a fast track by speeding up the permitting process through the State Coastal Commission and State Lands Commission. It also mandates state agencies and key stakeholders to jointly develop a long-term plan for offshore wind infrastructure. Over the next two years the Coastal Commission will bring state agencies and key stakeholders together to create a statewide standard, develop data-driven strategies to minimise impacts to fisheries and mitigate for impacts.

Senator Mike McGuire said: "The signing of SB 286 shows the Golden

State is serious about bringing on desperately needed new renewable power generation and meeting the state's nation-leading climate goals and energy needs. This bill will expedite the state-side offshore wind permitting process eliminating a staggering five years off of the permitting timeline."

A second Act extends 2021 legislation that directs the California Energy Commission (CEC) to establish offshore wind targets for 2030 and 2045 by June 1, 2022, and a strategic plan for offshore wind development in California by the end of June 2023. The

new law requires a plan and strategy for seaport readiness that builds on the recommendations and alternatives in the strategic plan. California now aims to have 2-5 GW of floating offshore wind capacity by 2030 and up to 25 GW installed by 2045.

Meanwhile, a recent study by the National Renewable Energy Laboratory found that California's wave energy potential can power approximately 13 million homes. Now, under new legislation, the California Energy Commission will work with state agencies and stakeholders to identify

suitable locations for wave energy and tidal energy projects in Californian and federal waters.

Wave energy developer Eco Wave Power Global welcomed the new law as a "historic moment for wave energy in America". San Diego Senator Steve Padilla, who introduced the legislation, said: "Ocean energy is one of the largest untapped sources of renewable energy, and California is now well-positioned to harness that energy and accelerate our transition to 100 per cent clean energy while creating high-paying jobs."

Thermal storage in Alaska wins DOE funding

The US Department of Energy (DoE) has funded a 1.2 GWh long-duration energy storage (LDES) system in Alaska under development by Westinghouse Electric Company to support planned new wind farm developments in the state.

The funding was part of \$325 million granted to 15 LDES projects by the Biden administration, which has made LDES one of its 'Earthshot' initiatives that aims, within the decade, to reduce the cost of grid-scale storage by 90 per cent for systems that export for more than ten hours.

US Secretary of Energy Jennifer M Granholm said: "As we build our clean energy future, reliable energy storage systems will play a key role

in protecting communities by providing dependable sources of electricity when and where it's needed most, particularly in the aftermath of extreme weather events or natural disasters."

The thermal storage system developed by Westinghouse, and advanced in collaboration with heat-to-power systems provider Echogen, uses a heat pump to draw electricity from the grid and uses it to heat concrete blocks. The energy is converted back into electricity using a heat engine.

The project also includes Golden Valley Electric Association, ASRC Energy Services, the Electric Power Research Institute (EPRI) and Shell Global Solutions US.

Investment in electrification 'will cut energy bills by 2050'

By 2050 the US electricity grid must increase its capacity by 250 per cent to accommodate electrification, but electrification will benefit consumers because cheaper electricity generated by renewables will halve household energy bills. That was the conclusion of DNV's 'Energy Transition Outlook' North America report, which explores the energy future of the US and Canada to the middle of the century.

The report says capital expenditure on renewables will overtake expenditure on fossil fuel by 2040 and \$12 trillion dollars will be spent in the two countries on grid and renewables by 2050. But electrification means that overall expenditure on energy will be

the equivalent of 2.5 per cent of GDP by 2050, compared to 4 per cent now.

The Outlook says a current bottleneck in transmission lines has to be addressed and new policies in both the US and Canada aim to do that. But DNV believes that network operators will capitalise on the vast market for renewable power. Remi Eriksen, Group President and Chief Executive at DNV, said: "The \$12 trillion to be spent on renewables and grid infrastructure in the US and Canada should be viewed as an opportunity to put the region at the heart of technologies essential to the global energy transition, such as hydrogen e-fuels, whilst reducing energy bills for households."

US offshore wind projects navigate choppy financial waters

- New York project developers denied increased returns
- New Jersey solicitation prompts 3 GW bids

Janet Wood

New York state governor Kathy Hochul has released a new 10-Point Action Plan on renewable energy that will include an accelerated renewable energy procurement process for offshore and onshore projects that will 'backfill' contracted projects that are terminated.

The announcement follows a decision by the New York State Public Service Commission to deny petitions filed by a group of offshore wind developers seeking financial relief for four proposed offshore wind projects and 86 onshore renewable projects. The petitions had been submitted by Empire Offshore Wind, Beacon Wind, Sunrise Wind and the Alliance for Clean Energy New York.

The offshore developers wanted terms in their offshore renewable energy credit (OREC) contracts that would adjust for inflation, and also include interconnection cost adjustment. Equinor and BP also requested a five-year extension of the contract

for the 810 MW Empire Wind 1 offshore wind farm.

Ørsted and Eversource said that without this intervention "it would not be able to obtain a final investment decision allowing it to fully construct the project" and the Equinor-BP joint venture noting that price adjustments would "restore the projects' ability to attract the capital required for them to move forward".

The Commission said a robust competitive bidding process that provides critically needed renewable energy resources to New York in the fairest and most cost-effective manner protects consumers.

"The requested amendments to the contracts would have provided adjustments outside of the competitive procurement process; such relief is fundamentally inconsistent with long-standing Commission policy," commented Commission Chair Rory Christian.

Nevertheless, companies have still continued to bid for new offshore wind projects. Attentive Energy, a

joint venture between Corio Generation and TotalEnergies, responded to the New Jersey Board of Public Utilities third offshore wind solicitation by offering up to 1.3 GW of offshore wind. Two Attentive Energy projects, if awarded, would total 3 GW. Attentive Energy Two will serve communities in New Jersey, while Attentive Energy One – co-owned with Rise Light & Power – has also bid into New York State's third offshore wind solicitation.

Meanwhile, the first turbines have been installed at the first offshore wind project in the US, Vineyard Wind 1 offshore of Massachusetts. The site is being powered with 62 GE Haliade-X 13 MW wind turbines.

State Representative Antonio F.D. Cabral said: "To see the fully constructed wind turbine generator is to realise the promise of the offshore wind industry – clean, green jobs; new green energy to combat the climate crisis and reduce rates for consumers; and the successful collaboration between our public, private, and labour partners."

Asian investment bank makes first loan to Argentina for wind farm development

The Asian Infrastructure Investment Bank (AIIB) has agreed a \$65 million loan to the government of Argentina's Tierra del Fuego province to construct a wind farm in the city of Río Grande.

Through the loan, BAII will finance a 33.6 MW wind farm, a 33 kV line and feasibility studies for other wind farms in the province, which has "exceptional" wind speeds.

This is the first time the AIIB has agreed financing for Argentina as a

promote country, and it will be used to promote the "first renewable energy project on a commercial scale in the province".

Konstantin Limitovskiy, Vice-President of investment operations for region two of the BAII (which includes Pakistan, Afghanistan, Central, East and West Asia, Europe, Africa and Latin America), said that the project "opens up a new market" for the institution and will enable it to work with

other countries in the region. He added that "Argentina is a crucial player in the energy transition and the BAII fully supports its goal of implementing projects that generate local environmental improvements and investments dedicated to climate action".

The province's Secretary of Hydrocarbons, Alejandro Aguirre, said that the agreement for the first loan had required "long technical work by the government teams".



State electricity company PT PLN (Persero) will need massive investment to finance its green energy programme.

Syed Ali

State electricity company PT PLN (Persero) will need \$155 billion in investment to implement the green energy-based national electricity development programme in 2023–2040, as the country works towards its 2060 net zero target.

Speaking at a press briefing on the 78th National Electricity Day Enlit Asia 2023 in Jakarta last month, PLN's Director of Risk Management, Suroso Isnandar, said it was a "fairly realistic investment value" that would be used to build new power plants, increase transmission and distribution capacity, and develop smart grids.

According to Isnandar, PLN will tap various funding sources to finance this investment, including the state budget, loans from international financial institutions, and private sector investment.

The company recently established new and renewable energy development cooperation with nine Chinese companies during the Indonesia-China Business Forum (ICBF) in Beijing, China.

According to a press release, President Joko Widodo (Jokowi) witnessed the signing of two cooperation agreements between PLN and two Chinese clean energy companies during his visit to meet Chinese President Xi Jinping in October. In addition to the inking of two memoranda of understanding (MoUs) witnessed by President Jokowi, PLN signed several MoUs, with a total value of \$54 billion, which include cooperation with the Export-Import Bank of China, Sinosure, and the Bank of China. Further agreements were reached with the Industrial and Commercial Bank of China, State Development & Investment Corp. Ltd.,

Huawei Tech Investment, and China Energy International Group.

PLN also signed an MoU with the State Grid Corporation of China (SGCC) and Trina Solar China on smart grid development. Smart grid development is considered the backbone of clean electricity in Indonesia and its climate change commitments.

Under its pledge to reach net zero emissions by 2060 or sooner, the southeast Asian nation has committed to a 29 per cent reduction in greenhouse gas (GHG) emissions by 2030, or a 41 per cent reduction with international support.

Ahead of COP28 to be hosted in the UAE in a few weeks, PLN signed an agreement with Abu Dhabi Future Energy Company PJSC – Masdar to develop Phase II of the Cirata floating photovoltaic (FPV) power plant. The agreement will expand the project by

up to 500 MW. The initial 145 MW phase of the floating PV project, located in the Cirata reservoir in West Java, Indonesia, is expected to come online later this year.

Such projects are part of the government's drive to develop projects based on new energy sources such as nuclear, hydrogen and ammonia.

In October PLN also announced that it has begun to produce green hydrogen, or hydrogen produced using renewable energy, at the first green hydrogen plant in the country.

According to a press release issued by the Ministry of Energy and Mineral Resources (ESDM), the facility is set to produce about 51 tons of hydrogen per year using 2795 MWh of electricity generated using solar panels.

Currently, Indonesia's annual hydrogen production is 1.75 million tonnes. However, green hydrogen is

still relatively expensive due to factors including high costs in electrolysis and renewable electricity production, and low renewable energy capacity.

Last month Yudo Dwinanda Priaadi, the Director General of New and Renewable Energy and Energy Conservation of ESDM said that Indonesia needs affordable new energy sources that are accessible to everyone.

He anticipated that by 2060, most of the energy used in the country will be solar energy but it will need batteries to store the energy.

Scaling up renewables could save Indonesia, the largest energy user in the Association of Southeast Asian Nations (ASEAN) region, as much as \$ 51.7 billion per year when the impacts on air pollution and climate change are included, according to the International Renewable Energy Agency (IRENA).



The Asia Pacific region is forecast to invest \$3.3 trillion in power generation over the next 10 years, with 49 per cent earmarked for wind and solar, and 12 per cent for energy storage, according to recent Wood Mackenzie analysis. The region, however, is still leading the world in building coal fired plants.

"The Asia Pacific region is critical to the power sector's energy transition as it grows to over half of global electricity demand this year. The two largest markets in the region, India and China, are at the forefront of renewables growth, but are also leading the world in coal power deployments," said Alex Whitworth, Head of Asia Pacific Power & Renewables Research at Wood Mackenzie, during his keynote speech at Renewable Energy India Expo 2023.

India has some of the lowest cost renewables in the world, which has driven rapid deployment of large-scale wind and solar. This has pushed up the country's renewables share of power generation to 22 per cent in 2022, with wind and solar making up nearly half of the total.

But despite a 2070 carbon neutral target, India is still investing heavily in new coal power to support growth, with a pipeline of over 50 GW of projects planned and under construction. India's power demand is expected to rank third globally by 2050, after China and the US, and the future of its coal fleet will have a major impact on global carbon emissions.

In a report issued in early October, the United Nations Economic and Social Commission for Asia and the

Pacific (UNESCAP) said that more than 180 GW of capacity are under construction in Asia-Pacific "despite the UN calling urgently for an end to coal fired generation".

The report noted that the region "is by far the largest user of coal," accounting for about 80 per cent of the world's consumption in 2021.

ESCAP said that successful energy transition will depend on "finding ways to manage the phase-out of existing coal fired power".

"Transforming the energy system to meet sustainability goals involves reducing reliance on fossil fuels – notably coal – in addition to scaling up clean energy in an inclusive manner," ESCAP said.

India's ongoing effort to scale up renewables received a boost in late September as the Ministry of New and Renewable Energy (MNRE) issued a public notice for the tender for the allocation of offshore wind development areas off the coast of the Tamil Nadu region, with 7215 MW of capacity.

The country issued the call for seven locations off the Tamil Nadu region in the south of the country, with the proposed zones covering an area of 1443 km², capable of supporting more than 7 GW of capacity.

The notice outlines four areas, namely 2, 3, 4, and 7, set to be opened for bids early next year, with a total capacity of 4140 MW to be offered to the developers.

An additional 3075 MW of capacity spread across three sites is planned to be put on offer in 2025.



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FORWARD

Singapore sees opportunity to be energy trading hub

Singapore believes the long-planned ASEAN power grid offers a golden opportunity to become the region's trading hub for clean energy.

In September, Singapore's energy market regulator granted conditional approvals to five projects to import a total of 2 GW of low-carbon electricity from Indonesia into Singapore. These five conditional approvals follow the earlier conditional approval to Keppel Energy in March to import 1 GW of low carbon electricity from Cambodia. The approvals are part of Singapore's plan to import up to 4 GW of low carbon electricity by 2035.

Singapore's Energy Market Authority has issued a Request for Proposals (RFP) to appoint licensed low-carbon electricity importers. The RFP, which closes at the end of 2023, has drawn more than 20 proposals, including from Indonesia, Laos, Malaysia and Thailand.

Singapore is looking to deepen its

interconnections with its neighbours and this could be done more effectively through an ASEAN grid that allows power exchange between countries. It would also accelerate decarbonisation in the region.

"The uneven spread of renewable energy resources from solar and hydro to wind, and the associated intermittencies, should compel ASEAN countries to connect their electricity grids to optimise green power utilisation, said Sharad Somani, Head of ESG at Singapore-based KPMG. "A bi-directional power exchange infrastructure will also provide for enhanced security of supply, while also making more affordable green power available across countries."

As Singapore works to soften the potential impact on its booming petrochemical sector caused by a shift from fossil fuels, industrialists see the opportunity offered by an ASEAN grid.

Tan Wooi Leong, Surbana Jurong's

energy and industrial Managing Director, said: "The ASEAN transmission grid is very critical. Singapore understands trade very well and we know how it's done. As long as we can bring the molecules (hydrogen) and renewable electrons through a certain central location, we could probably start trading them."

But the ASEAN grid, which is hoped will integrate the national power systems of its 10-member countries has technical and financial challenges. Ambitions among the governments will have to be managed too.

BMI's power and renewables analyst David Thoo pointed to a setback two years back when Malaysia's previous government announced it would ban the export of renewable electricity in 2021. "While the current government announced in May 2023 that the ban will be lifted, it has yet to happen, which goes to show that policy does take a while to move."

UK companies target Australia's energy storage market

Australia's energy storage market is attracting UK battery project developers as the country accelerates its shift to renewables.

Early last month Octopus Investments Australia, a unit of Britain's Octopus Group, acquired a 500 MW/1000 MWh battery energy storage project under development in Queensland by Sydney-based Flow Power.

The Blackstone project will create the largest battery in Queensland and will be capable of discharging electricity to supply up to 70 000 homes daily, Octopus said.

The proposed battery is planned to be installed southwest of Brisbane, adjacent to the existing 275 kV Blackstone substation in Swanbank. It will connect into the high-voltage transmission network and store and dispatch electricity during high-demand periods. The facility will help stabilise the local grid by providing frequency and voltage control services.

Octopus said it is currently working with electricity transmission infrastructure operator Powerlink, Ipswich City Council and Firm Power to complete development activities and expects to reach a final investment decision in the second half of 2025. According to Flow Power's website, the project's development application is at an advanced stage of assessment and grid connection studies have commenced.

Octopus noted that the Blackstone battery acquisition will enable it to offer "market leading power purchase agreements providing firmed blocks of energy".

Shortly after the news, British battery storage developer Pacific Green Technologies Inc. announced that it was in the process of acquiring land in the state of Victoria, where it plans to install battery storage facilities with a combined capacity of 1 GW/2.5 GWh.

The company's Australian unit has entered into an exclusivity agreement to secure sites in Portland, expecting to be able to kick-off construction works next year. The energy storage systems are anticipated to go live two years later, in 2026, Pacific Green said.

Specific details about the proposed deal being negotiated by Pacific Green Technologies Australia Pty Ltd were not available. According to the parent company, the Australia expansion will be possible thanks to the £74 million (\$90.1 million) divestment of a 100 MW/100 MWh battery energy storage system (BESS) in England this summer.

"By acquiring this site and project rights, we have now positioned Pacific Green to become one of the largest battery park developers in the Southern Hemisphere," said Joel Alexander, Pacific Green's Managing Director in Australia.

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Europe News

Westinghouse and Bechtel sign engineering services contract for Polish nuclear plant

- Vogtle sister unit plans for commercial operation this year
- Project to be a 'model' for more plants in Poland and beyond

Janet Wood

Westinghouse Electric Company, Bechtel and Polish utility Polskie Elekrownie Jadrowe have signed an engineering services contract for Poland's first nuclear power plant at the Lubiatowo-Kopalino site in Pomerania. The contract includes finalising a site-specific design for three Westinghouse AP1000 nuclear islands, turbine island and balance-of-plant design work, and support for licensing activities.

Both US-based Westinghouse and

Bechtel are completing a sister project known as Vogtle in Georgia in the US.

"Consistent and timely implementation of the schedules assumed, but also the scope of the contract being executed today, confirm our determination to build the first nuclear power plant within the target timeframe, in line with the budget, and with the optimum utilisation of the Polish industry," said Anna Lukaszewska-Trzeciakowska, Government Plenipotentiary for Strategic Energy Infrastructure.

"This is one of the most significant steps forward to date in US-Polish

civil nuclear cooperation. I commend the Polish government and the companies involved in the project for their focus in seeing this effort through to this critical point," said Mark Brzezinski, US Ambassador to Poland. "This is not just a commercial venture. Our hope is to support Poland as it becomes a hub for civil nuclear technology deployment."

Fragman, Westinghouse President and CEO, said: "This is a transformational moment for Poland, for our partners, and for Westinghouse," noting that the Polish project "will be a

model for other countries" that seek decarbonisation and energy security through safe, reliable nuclear energy.

Craig Albert, President and Chief Operating Officer at Bechtel, added: "Poland's first nuclear power plant is a historic project, vital to the country's energy security and energy transition goals."

The AP1000 reactor uses passive safety systems and modular construction design and it claims the smallest footprint per MWe on the market. At Vogtle, one AP1000 unit is producing power for the grid and the second

expects commercial operations later this year or early next year. Four AP1000 reactors are in operation in China with six under construction.

Meanwhile the 1.1 GW Baltic Power offshore wind project in Poland, being developed jointly by the Polish energy company Orlen and Canadian Northland Power, has reached financial close on 20-year funding of €3.6 billion. Northland and Orlen signed a credit agreement for the financing with a consortium of 25 financial institutions. Full commercial operations are expected in the latter half of 2026.

Networks must prepare now to support 600 GW solar rollout, says Eurelectric

Europe's electricity network must get ready to accommodate 600 GW of solar capacity by 2030, said Eurelectric, the organisation representing Europe's electricity utilities.

It called for network planning, standardised procedures, digitalisation, more transparent data exchange and a comprehensive assessment of flexibility tools.

The group warned that connection delays caused by congested grids and slow permitting are driving up PV installation costs. "The energy system is changing fast, so we need a new, forward-looking approach when we

modernise and expand our electricity grid," said Eurelectric Secretary General Kristian Ruby.

Meanwhile Miguel Stilwell d'Andrade, Chief Executive of EDP, said solar developers needed to de-risk their supply chains. Chinese companies dominate global production of solar panels and EDP's Madrid-based subsidiary had to delay some work last year because of concerns over slave labour. It had started sourcing from South Korea, Malaysia and Vietnam. "I think it's important that the supply chain is de-risked for any scenarios," he said.

Floating wind projects increase, adding hydrogen production

The pipeline of floating offshore wind projects has grown by over 30 per cent in the last 12 months, from 185 GW to 244 GW, according to RenewableUK's EnergyPulse Insights report.

It listed 14 operational projects totalling 227 MW in seven countries, of which five are in Europe. It said Norway has the most with 94 MW across three projects. The UK's two projects total 80 MW and Portugal's one wind farm is 25 MW in size. Nearly two-thirds of floating wind capacity announced so far worldwide is being developed in European waters.

RenewableUK believes that the government's target of reaching 5 GW of floating wind in UK waters by 2030 remains achievable, but the next CfD

auction and future rounds must be underpinned by sustainable parameters.

Meanwhile Poland-based Respect Energy Holding has unveiled plans to build an 820 MW floating offshore wind farm in cooperation with Balti-Connect off the coast of Estonia that will have foundation technology with hydrogen and ammonia production included. The project is due to start up in 2032.

"Floating offshore wind is an abundant blue renewable energy resource in Portugal, with a high potential of monetisation already in the present decade, and also of regenerative impact for marine ecosystems," said Ruben Eiras, Secretary-General of Forum Oceano.



- Electric vehicle users invited to vary charging times
- Networks offer new flexibility contracts

Janet Wood

The UK's system operator National Grid ESO (ESO) is using electric vehicles for the first time in its 'Balancing Mechanism' market that matches energy supply and demand at the point of dispatch, in a collaboration with customers of supplier Octopus Energy.

It will work via the supplier's 'Intelligent Octopus' EV tariff. New technology automatically adjusts the charging schedule of the car in response to the ESO requests for more or less power. Kraken, Octopus's tech platform, will connect to Octopus customer EVs and continually manage their response depending on changing grid needs and customer charging targets will still be met.

Meanwhile two network operators have opened invitations for parties to provide flexibility services via the Piclo platform.

In a two-year contract SP Energy Networks is simplifying the procurement journey for flexibility service

providers by removing the need to onboard them through multiple different platforms. It heard a "strong message" from potential providers that reduced complexity and standardisation would help them to participate. Piclo's new end-to-end service will support these objectives.

UK Power Networks offered its first flexibility tender for 95 MW in 2019. Since 2018, the company has awarded contracts to 38 companies for nearly 2 GW of flexibility up to 2028.

Now it has put its largest ever flexible electricity offering on the market, launching simultaneously on the Piclo platform and at a launch webinar. It has 850 MW of opportunities available for bidders in London, the East and Southeast of England who can increase or decrease in 452 different zones.

Alex Howard, Head of Flexibility Markets at UK Power Networks' distribution system operator, said: "We've been offering flexibility opportunities for several years now but

this latest tender round is our biggest. It demonstrates how we are opening our networks through the use of technology and data.

"We need flexible assets on our network to cut costs for our customers and maximise the generation of renewable energy options which are so crucial for helping us achieve net zero."

Such flexible options are seen as important in managing electricity grids in future.

Eurelectric Secretary General Kristian Ruby said: "... integrating a high share of variable renewable generation still poses challenges to maintaining grid stability. This calls for greater flexible capacity to ease congested areas and help balance the grid.

"Once mapped, all flexible solutions from local flexibility markets to non-market alternatives such as flexible connection agreements should be assessed to increase flexible capacity and support operators in managing grid congestion."

'Projects of Common Interest' could benefit fossil industries, environmental groups warn

A draft list of European energy infrastructure projects that will receive support from the EU has prompted warnings from environmental groups that it could favour gas incumbents.

The EU's 'Projects of Common Interest', produced every two years, are important pieces of infrastructure

such as electricity interconnectors that support the bloc-wide Internal Energy Market. They have support in permitting to help them progress as fast as possible, and can access €5.4 billion worth of EU funds, but they must be deemed as crucial to meet energy security and decarbonisation goals.

However a draft new list of around 150 projects was described as a "wish list" for oil and gas majors. Around half of them are assets such as pipelines badged as being for hydrogen transmission that campaigners claim are likely to be used by the fossil fuel industry. The document seen by the

Financial Times, must still be signed off by the European Commission.

Frida Kieninger, Director of EU affairs at Food & Water Action Europe told the *FT*: "A fossil gas pipeline going from A to B with a certain size and a certain route is designed for transporting gas via a certain route.

It's not necessarily what would work for hydrogen."

Ghassan Wakim, Production and Export Director for zero-carbon fuels at the NGO Clean Air Task Force, said claims that natural gas pipelines could be made "hydrogen ready" were not proven.

8 | International News



- Solar power and EVs drive race to net zero
- IEA urges 'bolder action' this decade

Junior Isles

Driving greenhouse gas emissions from the world's energy sector to net zero and limiting global warming to 1.5°C remains possible due to the record growth of key clean energy technologies, though momentum needs to increase rapidly in many areas, according to a new edition of the International Energy Agency's landmark Net Zero Roadmap.

The new Roadmap sets out a global pathway to keep the 1.5°C goal in

reach, providing a comprehensive update to the groundbreaking original report published in 2021 – a benchmark for policy makers, industry, the financial sector and civil society.

The 2023 Update incorporates the significant changes to the energy landscape in the past two years, including the post-pandemic economic rebound and the extraordinary growth in some clean energy technologies – but also increased investment in fossil fuels and stubbornly high emissions.

Since 2021, record growth in solar

power capacity and electric car sales are in line with a pathway towards net zero emissions globally by mid-century, as are industry plans for the roll-out of new manufacturing capacity for them. This is significant, since those two technologies alone deliver one-third of the emission reductions between today and 2030 in the pathway.

The IEA stresses, however, that bolder action is necessary this decade. In this year's updated net zero pathway, global renewable power capacity triples by 2030. It also says fossil

fuel demand must fall by a quarter by the end of this decade.

Meanwhile, researchers with the Mercator Research Institute on Global Commons and Climate Change recently said "plummeting" prices for solar power and storage over the last 10 years have made a net zero transition more feasible than current climate scenario models indicate.

In a new study, MCC found that "two key options for rapid decarbonisation remain systematically under-sampled in models that underpin [Intergovern-

mental Panel on Climate Change] scenarios", those being – strong growth in intermittent renewables, and widespread adoption of efficient end-use technologies.

"Some calculations even suggest that the world's entire energy consumption in 2050 could be completely and cost-effectively covered by solar technology and other renewables," said Felix Creutzig, lead author of the study. "This is an extremely optimistic scenario but it illustrates that the future is open."

Rwanda shuts down diesel as largest methane power plant connects to grid

Rwanda has connected its biggest methane gas power plant to the national grid, marking a step further towards cheaper, diversified sources of energy and tapping into the gas reserve under Lake Kivu.

The methane plant was connected as the country shut down all diesel-powered plants, which were the most expensive of all the current energy sources.

Delayed by the Covid-19 pandemic and technical issues, the \$400 million plant, run by Shema Power Lake Kivu (SPLK), has a capacity of 37.5 MW, due to rise to 56 MW early next year.

Located on the shores of Lake Kivu, in Rubavu District, the plant commissioned its first gas-to-power in March

2023, with an initial 14 MW of capacity. Upon completion, it will have a capacity of 68 MW, with around 50 MW injected directly into the grid, according to SPLK's Chief Executive Alex Kabuto.

The gas extracted from 300-400 m underwater is washed in SPLK's on-shore tanks to separate it from water and other gases before it is processed. Lake Kivu has 60-70 km³ of methane, of which at least two-thirds can be extracted, according to official estimates.

Rwanda's total installed electricity generation capacity is 332.6 MW. By generation technology mix, 51 per cent is from thermal sources, followed by hydro sources (43.9 per cent) and solar sources (4.2 per cent).

India and Saudi Arabia to collaborate on green hydrogen

India and Saudi Arabia have inked a Memorandum of Understanding (MoU) aimed at establishing a sustainable green hydrogen supply chain and fostering collaboration on power grid interconnection.

India's Minister for Power and new and renewable energy, RK Singh, and Saudi Arabia's Minister of Energy, Abdulaziz bin Salman Al-Saud, signed the agreement in early October in Riyadh, during the MENA Climate Week 2023.

The two nations made an agreement in September covering various aspects of energy cooperation such as renewable energy, energy efficiency, grid connectivity and energy security.

With a fast-growing population and the world's fifth-largest economy, India is pursuing measures to decrease the emission intensity of its GDP by 45 per cent by 2030. It is also committed to achieving net zero emissions by 2070.

The MoU establishes a framework for cooperation in the areas of: electrical interconnection; exchange of electricity during peak periods and emergencies; collaborative project development; joint production of green and clean hydrogen, and renewable energy; building secure, dependable and resilient supply chains for hydrogen and renewables.

Minister Singh said that green hydrogen could help accelerate India's energy transition, and that India had launched a National Green Hydrogen Mission for harnessing this energy source, with an initial outlay of \$2.3 billion.

The minister urged MENA countries to join the Global Biofuel Alliance in order to advance international cooperation in sustainable biofuels to realise the full potential of the Alliance to develop and deploy sustainable biofuels, and facilitate trade in biofuels and much more.



- Shutdowns could be delayed to 2030
- World Bank \$1 billion loan on the cards

Nadia Weekes

Eskom has said it is "exploring options" to delay to 2030 the shutdown of old coal-fired power stations due for decommissioning, as South Africa's state-owned power utility grapples with improving the performance of its generation fleet.

A new decommissioning timeline is dependent on the outcome of appeals connected to the facilities' emissions standards.

Delaying the decommissioning of plants such as Camden and Hendrina – due to shut down in 2023 and 2026, respectively – would give Eskom more time to add sufficient renewable capacity to replace the capacity that will be lost when these plants stop generating.

Komati power station in Mpumalanga was the first of Eskom's coal fired fleet to shut down last year. It has now been recognised that initiatives to generate renewable energy at Komati should have been implemented sooner, to avoid the time lag between its shutdown and the launch of new programmes aimed at clean power generation, job creation and skills training.

The under-review 2019 Integrated Resources Plan outlines plans for five coal fired plants (including Komati, Camden and Hendrina) to shut down before 2030. Kriel and Arnot are due

to be fully decommissioned by 2029.

Under current rules by the department of forestry, fisheries and the environment, Eskom must shut down about 30 GW of coal fired generation capacity by April 2025, but that is still under review.

Appeals have been lodged by non-governmental organisations and Eskom against the air quality rules forcing the shutdowns, while the Centre for Environmental Rights has lodged appeals against the decision to suspend compliance for some power stations without detailed and clear decommissioning schedules accompanying the applications.

Facing a barrage of complex and conflicting appeals, Environment Minister Barbara Creecy has appointed an expert panel to advise on appeals related to air quality decisions. A report with findings and recommendations is expected in February 2024.

Vikesh Rajpaul, who leads Eskom's Just Transition office, said that emissions standards were not the only factor at play in determining whether and for how long to delay the decommissioning of old plants. Eskom had to consider cost and operational safety requirements too, he argued.

Due to financial constraints, Eskom has not been able to properly maintain units at older power stations. "We cannot run a plant if it is not technically

safe to do so," Rajpaul said. Delaying the decommissioning of old coal plants could also limit Eskom's access to international Just Transition funding.

Meanwhile, the government of South Africa has begun discussions with the World Bank to extend a \$1 billion loan to support Eskom's transmission company.

South Africa continues to be affected by persistent power outages. Despite receiving multiple bailouts from the government in recent years, Eskom continues to be hobbled by worsening operational and financial problems.

The utility has been unbundled into three divisions – generation, transmission and distribution – to improve its management. The launch of the transmission company depends on the finalisation of agreements with the utility's lenders and the appointment of a board before the end of the year.

South Africa's budget deficit is estimated at ZAR 12.8 billion (\$680 million) for September 2023, compared with a deficit of ZAR 3.3 billion in September 2022. "Debt in itself is not a problem... if the economy grows enough to service the debt then the debt is not a challenge," Masondo said, arguing that debt incurred to "sort out electricity and transmission" would build value and increase the country's capacity to grow the economy.

Cloud hangs over green stocks as sector falls 20 per cent

A global surge in inflation and high interest rates has seen companies hit by a huge rise in costs. The challenging market has seen renewables stocks plummet in recent months. **Junior Isles**

Renewable energy stocks have seen a fall of over 20 per cent in two months, as higher interest rates continue to negatively impact the sector.

In early October the S&P Global Clean Energy Index, which is made up of 100 of the biggest companies in solar, wind power and other renewables-related businesses, recorded a 20.2 per cent fall during August and September. This has set it on track for its worst annual performance in 10 years.

Commenting on the news, Martin Frandsen, a portfolio manager at

Principal Asset Management, told the *FT*: "There's a dark cloud hanging over green stocks. Two years ago we got a huge growth in commitments to hit net zero, which translated into a lot of investment opportunities. Then we hit this inflation wave and companies that locked in their [electricity] prices have been left very exposed. The lag effect is hitting now."

The difficulties have arisen despite tens of billions of dollars in tax credits, subsidies and loans being offered by governments to green energy companies in the US and Europe.

European solar module manufacturers recently warned that a flood of cheap Chinese alternatives are pricing local companies out of the market. "Big supply-demand imbalances have been building up over the past year or so," Fiona Manning, an emerging markets portfolio manager at Premier Miton, told the *FT*.

The renewables sector has been particularly vulnerable to rising interest rates because many companies agree long-term contracts, fixing the price at which they will sell energy, before developing projects.

As global inflation has surged, companies have been hit by a huge rise in costs, exacerbated by growing demand for renewable projects, while elevated rates have made their high levels of borrowing more expensive to service.

Wind and solar power players have been among the hardest-hit. Swedish wind farm developer Vattenfall in July said its costs had climbed 40 per cent. At the end of September, US-based wind and solar generator NextEra Energy announced a cut to its three-year growth expectations.

At the start of October SolarEdge Technologies had lost almost 60 per cent of its value and its share price was down 67 per cent from its peak in November 2021. The Israeli solar energy company's market cap on Nasdaq at the start of October was \$7.3 billion, making it the eighth most valuable Israeli company on Wall Street, after being the most valuable Israeli company for a period.

SolarEdge develops and markets solar inverters for photovoltaic arrays and other energy generation and storage products.

Brookfield acquires UK renewables developer

Canadian investment firm Brookfield Asset Management is buying Banks Renewable, one of the UK's largest independent developers of onshore wind farms for an undisclosed price. The deal, said to be worth almost \$1 billion (£823 million), is expected to be completed by the end of this month.

Sebastian Perl, the Brookfield Vice-President who led the transaction, said he thought there was "generally a very positive outlook" for renewables in the UK and that cost pressures for onshore wind were short-term.

"We have a long-term view as a long-term investor," he said. "There might be some challenges along the road but you have that with every market, every business. It hasn't changed our view on the market or the investment

environment in the UK."

Banks Renewables owns and operates 11 onshore wind farm projects across Scotland and the north of England generating 282 MW of renewable energy.

The firm said it has planning permission for 15 new wind farms with a capacity of around 307 MW, and proposals for wind farms with a potential 580 MW capacity going through the planning system.

Banks Renewables is also developing renewable and flexible energy projects, including new solar arrays and a battery energy system.

Banks Group founder and Chairman Harry Banks said Brookfield's resources would enable the "fuller development of opportunities" the firm is bringing forward.

Valmet secures loan to support clean R&D activities

Finnish company Valmet has signed a €175 million loan agreement with the European Investment Bank (EIB) to support research and development (R&D) of technologies that replace fossil fuels with renewables. The loan agreement is linked to the company's R&D activities in 2023-2026.

The financing aims to: enhance the resource and energy efficiency as well as the performance of Valmet's technology; promote the use of recyclable raw materials; and to improve the sustainability of Valmet's operations. The financing is part of the EIB's dedicated package of support for RE-PowerEU – the EU plan to eliminate dependence on fossil fuel imports.

Valmet's R&D spending was €95

million in 2022. It has 28 research and development centres around the world and approximately 1300 protected inventions.

"The aim of Valmet's research and development work is to create new technologies, products and services that address customer needs and help respond to some of the most important global megatrends: enhancing the efficiency of raw materials, water and energy, promoting the use of renewable raw materials and reducing emissions. We're happy about this loan agreement as it improves Valmet's readiness to support the green transition in Valmet's customer industries," said Janne Pynnönen, Vice President, R&D, Valmet.

Siemens Energy seeks government guarantees as wind troubles deepen

German engineering giant Siemens Energy is in discussions with the government to secure billions of euros of guarantees for long-term projects after warning that losses at its ailing wind turbine business would be higher than forecast.

The company said it needed backstops for projects as the outlook at its wind turbine business worsens. In June, Siemens Energy said that overhauling the division, which has been beset by technical issues, would cost €1 billion.

Without the guarantees, a €110 billion portfolio of clean energy projects planned by the company will be in jeopardy, according to executives.

Siemens Energy said in a statement that it was also evaluating measures to "strengthen its balance sheet", and was in talks with both banks and the government.

It also said that its gas and power businesses were on track to meet targets this year, thanks to "excellent performance".

In August Siemens Energy said it was reviewing the strategy of its wind subsidiary Siemens Gamesa in response to challenges at the business that led the German group to project an annual net loss of around €4.5 billion (\$4.93 billion).

Its third-quarter results were hit by €2.2 billion in charges at Siemens

Gamesa, as a result of quality issues with certain rotor blades and main bearings in its 4.X and 5.X onshore platforms, as well as higher product costs and ramp-up difficulties in the offshore business.

In late September German business daily *Handelsblatt*, reported that Siemens Gamesa had largely suspended new business with its problematic onshore wind turbines for the time being.

"Our absolute priority is to revise the affected systems in existing customer projects. That's our focus," the spokesperson for Siemens Energy commented without giving any further details.

ABB agrees global partnership for financing clean tech projects

ABB and Export Development Canada (EDC), Canada's export credit agency, have signed a global partnership to promote investments in sustainable technologies and projects in Canada and around the world.

The support provided by EDC, with a total limit of up to \$2.9 billion, will provide ABB's customers with financing and insurance solutions to strategic electrification and automation projects in the sectors of clean technologies, advanced manufacturing, digital

technologies, and resources of the future. Commercial financing will be provided on a project-by-project basis and the partnership will initially run for three years.

The partnership aims to foster investments globally and locally in Canada both through ABB's customer projects and within the company's own operations. EDC will finance and provide insurance to customer projects across the ABB portfolio – from electrification, motion, process

automation to robotics and discrete automation.

A specific focus will be on strategic investments in technologies and solutions with growth potential, such as green hydrogen production, sustainable transport solutions or the electrification of today's fossil-based activities to reduce global greenhouse gas emissions. Collaboration with innovative Canadian start-ups is also an essential topic under the umbrella of the partnership with EDC.

10 | Tenders, Bids & Contracts

Americas

Maintenance contract for Newfoundland plant

Newfoundland and Labrador Hydro has awarded a multi-year plant maintenance contract for its 500 MW oil-fired Holyrood Thermal Generating Station in Newfoundland, Canada to Babcock & Wilcox Canada. The contract is valued at \$11 million, with options for additional work.

B&W Canada will manage and execute maintenance services for the plant's boilers and boiler auxiliary equipment, including annual standard maintenance as well as capital projects for the plant's units over the next three years.

Mike Hidas, Vice President and General Manager, B&W Canada, said: "We thank Newfoundland and Labrador Hydro for choosing B&W Canada to provide maintenance and support for their plant, which provides energy for thousands of residents in the region."

CPS Energy issues RFP for energy storage

CPS Energy, a municipal utility from San Antonio, Texas, USA, has requested proposals for contracts of up to 500 MW of energy storage projects as part of a recently approved plan to reinforce its power generation.

This RFP is the first that CPS has issued for initiatives involving independent battery energy storage. Submissions were received in October and CPS Energy aims to make selections by the end of the year.

CPS Energy aims to install the storage facilities at various strategic locations within its service area to improve the power reliability in certain specific areas. This will help it to quickly respond to changes in customer electricity demand or grid conditions.

Vestas wins 136 MW Canadian wind order

Vestas has received a 136 MW order to power an undisclosed wind project in Canada. The order consists of 22 V162-6.2 MW wind turbines, covering supply, delivery, and commissioning of the turbines, as well as a multi-year Active Output Management 5000 (AOM 5000) service agreement.

Turbine delivery begins in the third quarter of 2024 with commissioning scheduled for the fourth quarter of 2024.

Asia-Pacific

JSW orders turbines for 653 MW Indian wind farm

JSW of Mumbai, India has placed an order with Shanghai-based Envision Energy for the supply of turbines for a 653.4 MW wind power project in India.

Envision Energy will deliver 198 units of its EN 156-3.3 MW machines. These have a rotor diameter of 156 m, a hub height of 140 m, and each have a generating capacity of 3.3 MW.

The turbines will be installed at two sites in the states of Karnataka and Maharashtra, to produce a total of 2200 GWh annually. The turbines will be commissioned sequentially, with the wind farms expected to be fully operational by the end of 2024.

The nacelles and hubs will be assembled at Envision Energy's factory in Pune Maharashtra, while the turbine blades will come from its factory on Trichy in Tamil Nadu.

Tower components will be sourced from manufacturers in Maharashtra.

Mitsubishi Electric VSC for converter station

Mitsubishi Electric has been awarded a contract by J-Power Transmission Network to supply a 300 MW Voltage Source Converter (VSC) for the Shin-Sakuma high voltage direct current (HVDC) transmission frequency converter station in Hamamatsu, Shizuoka prefecture. The system is expected to be in service by the end of March 2028.

Electricity in Japan is supplied at two different frequencies: 50 Hz in eastern Japan and 60 Hz in western Japan. Since grids operating at different frequencies cannot be directly connected, frequency converter stations are required to exchange power between the two regions. The aim of this project is to enhance interconnectivity between them through the construction of a new 50/60 Hz frequency conversion station on their border, part of the improvements being made to Japan's wide-area grid.

Vestas secures 38 MW Iwaki Miwa order

Toda Corporation has placed an order with Vestas for the 38 MW Iwaki Miwa wind farm located in Fukushima prefecture, Japan.

Iwaki Miwa is owned by JR East Energy Development, and will feature nine V117-4.2 MW wind turbines. Vestas will also supply 20 years of Active Output Management 5000 service, including an energy-based availability guarantee.

The delivery of the turbines is set to commence in the first quarter of 2026, with commissioning scheduled for the same year.

LS Cable to install Korea submarine cables

LS Cable and LS Marine Solution were selected as preferred bidders for the submarine cable contract in the Anma Offshore Wind Power Project. The project aims to establish a 532 MW offshore wind farm near Anma Island, Yeonggwang County, South Jeolla Province, South Korea. It is the largest of its kind among ongoing offshore wind projects in Korea.

The work involves development of high-capacity power submarine cables for the external network connecting the wind farm to the mainland. The total length of the submarine cables to be installed will span several kilometres.

A spokesperson for LS Cables said: "LS Cable is the sole company in Korea capable of supplying high-capacity submarine cables, and our experience in such projects is a significant factor."

GE Vernova awarded 9HA gas turbine order

China's State Development and Investment Corporation (SDIC) has ordered two GE 9HA.02 gas turbines from GE Vernova for a new combined cycle gas turbine (CCGT) power plant in the Zhoushan archipelago in Zhejiang province, China. The archipelago consists of over 130 urbanised islands.

The plant will have a capacity of 1.7 GW. The first unit is scheduled to begin commercial operation by the end of 2025 and is expected to burn up to 10 per cent by volume of green hydrogen blended with natural gas in the future.

The new power plant will support the growth of renewables, supplying power to ensure steady supply for when wind and solar are not available.

Europe

OX2 selects Vestas turbines for Anglarna

Wind turbine manufacturer Vestas has won an order from OX2 Construction for the 115 MW Anglarna wind power project in Sweden.

The order consists of 18 V162-6.2 MW wind turbines in 6.4 MW power optimised mode and includes supply, delivery, and commissioning of the turbines. On completion, Vestas will service the turbines under a 35-year service agreement.

Turbine delivery is expected to begin in the second quarter of 2026 with commissioning scheduled for completion in the fourth quarter of 2026.

Biomass power plant for Göteborg Energi

Göteborg Energi is building a new plant to produce energy and district heat from renewable and recovered sources by 2025, and has ordered a biomass power plant from Valmet. The value of the order has not been disclosed.

Valmet's delivery will include a 140 MWth Valmet BFB boiler as well as a flue gas cleaning system and a flue gas condensing system. The primary fuels will include forest residues and recycled wood chips. Start-up of the plant is scheduled for 2025.

Valmet will also deliver a boiler building and piping to connect the new boiler to the existing steam turbine. Valmet O&M services will maximise reliability and optimise performance.

\$1.87 billion contract to refurbish Cernavoda

Korea Hydro Nuclear Power (KHNP) has signed a consortium agreement with Canada's Candu Energy and Italy's Ansaldo Nucleare to jointly conduct a project to refurbish Romania's Cernavoda Unit 1 reactor. The contract is valued at \$1.87 billion.

Located 170 km east of Bucharest, the 700 MW Unit 1 at Cernavoda has been in operation since 1996 and its 30-year operating license is due to expire in 2026.

The Romanian government has sought to renew the license for an additional 30 years and Romania's nuclear energy company SNN plans to upgrade and replace key components starting in 2027.

KHNP will lead the construction part of the project, including building radioactive waste storage and other infrastructure, while Candu and Ansaldo will take charge of the engineering and procurement work as original designers of the unit.

Siemens Energy to stabilise Irish grid

Siemens Energy will deliver the first hybrid grid stabilisation and large-scale battery storage plant at Shanonbridge in Ireland. It said this is the first time these two technologies have been combined into one single grid connection to stabilise the grid.

The synchronous condenser technology uses a generator with a connected flywheel, providing power reserve to compensate for frequency fluctuations. It is combined with a 160 MWh battery energy storage system.

Siemens Energy will supply the synchronous condenser, including the flywheel, which will deliver around 4000 MW of inertia onto the system, and the battery energy storage system, as well as power conversion systems, energy management

system, and medium-voltage equipment. The contract is valued at €85 million.

Enerfin awards Nordex 45 MW wind order

Enerfin has awarded Nordex an order for a 45 MW wind farm in Spain. The order also includes a 20-year service agreement. Nordex will supply eight N155/5.X turbines from the Delta4000 series for the "Cernégula" wind farm in the northwest of Spain in the province of Burgos in Castile and León.

Installation of the turbines on tubular steel towers with a hub height of 105 m will begin in the summer of 2024, with commissioning scheduled for the end of the year.

Air Liquide to use Siemens Energy electrolyzers

Siemens Energy will supply 12 electrolyzers with a total capacity of 200 MW to Air Liquide's Normand'Hy project in Normandy, France. Air Liquide will operate the electrolyzers at its plant in the Port-Jerome industrial zone, which will produce 28 000 tons of renewable hydrogen for the industrial and mobility sectors, beginning in 2026.

Siemens Energy PEM electrolyzers have a brief ramp-up time and dynamic controllability that enables integration with intermittent renewable energy supplies.

The electrolyzers will be manufactured at Siemens Energy's production facility in Berlin.

International

Wärtsilä signs service agreement with AES

Wärtsilä has signed a renewal of its long-term service agreement for four years with Jordanian independent power producer AES. The agreement covers the 256 MW AES Levant power plant located east of Amman.

The AES Levant plant operates with 16 Wärtsilä 50DF dual-fuel engines fuelled by natural gas. The agreement includes spare parts for major overhauls of the engines and auxiliaries, engine overhaul services, remote troubleshooting assistance, and daily and monthly up-keeping reports.

Khalid Salameh, Operation Director of the AES Levant plant, said: "Wärtsilä has efficiently provided the support needed since the plant commenced operations, so it was quite natural that we wish to continue the agreement for a further four years."

EBRD finances Azerbaijan wind plant

The European Bank for Reconstruction and Development (EBRD) has announced it will finance construction of a 240 MW wind power plant in east Azerbaijan. This will be the first utility-scale wind power project in the country.

EBRD has arranged a syndicated loan of €190 million to ACWA Power Azerbaijan Renewable Energy, the project company owned by ACWA Power. The project will be co-financed by the OPEC Fund for International Development.

Once commissioned, the plant is expected to generate up to 893 GWh annually. It is expected to reduce carbon emissions by more than 400 000 tonnes annually.

The wind power project, which is located in Absheron and Khizi, follows last year's investment in the first utility-scale solar power plant in Garadagh.



Hydrogen

US takes leap to low-carbon economy with selection of nation-wide hydrogen hubs

US President Joe Biden and Energy Secretary Jennifer Granholm last month announced the selection of seven locations across the country where regional hydrogen hubs (H2Hubs) will be established. The H2Hubs will be funded by the government with \$7 billion over time with the intention of attracting billions more in private investment.

Gary Lakes

On October 13, the Biden Administration identified seven locations across the US that will serve as the initial regional hydrogen hubs (H2Hubs) that are expected to encourage growth in new clean energy technologies and fuels. Funded with \$7 billion from the Bipartisan Infrastructure Law, the government expects the hubs to accelerate the domestic market for low-cost, clean hydrogen and create tens of thousands of jobs. Total private investment in the H2Hubs is expected to reach more than \$40 billion.

Roughly two-thirds of total project investment are associated with green (electrolysis based) production within the hubs, a statement from the White House said, adding that several of the hubs were developed in close partnerships with unions, with three requiring project labour agreements (PLAs).

In addition to job creation and creating healthier air for communities, the selected hydrogen hubs are committed to robust Community Benefit Plans to ensure local priorities are at

the forefront and all communities share in the benefits of the clean energy transition, the statement added. The overall investment of some \$50 billion will be one of the largest investments in clean energy and jobs in history.

Taken together, the hubs will produce more than 3 million metric tons of clean hydrogen annually, thereby achieving nearly one third of the 2030 US clean hydrogen production goal. The seven hubs will also eliminate 25 million tonnes of carbon dioxide emissions from end users every year, which is roughly equivalent to the annual emissions of more than 5.5 million gasoline-powered cars.

According to analysts at energy consultant Wood Mackenzie, the US move makes a "significant step towards creating a low-carbon hydrogen economy".

"The H2Hubs, designed to accelerate the shift to a cleaner energy landscape, are poised to play a crucial role in achieving President Biden's ambitious targets, including a 100 per cent clean electrical grid by 2035 and net zero carbon emissions by 2050," Hector Arreola, Principal Analyst at Wood

Mackenzie, said in a statement commenting on the US action.

"This initiative also focuses on reducing the cost of clean hydrogen production to \$1 per kilogram by 2030, making it cost-competitive with conventional hydrogen within the next decade," Senior Research Analyst Bridget van Dorsten added. "This will help communities across the country benefit from clean energy investments and good-paying jobs."

Funding for the H2Hubs will be gradual. They have so far received \$20 million to develop detailed project plans over the next 12 to 18 months. Funding will be provided incrementally to each hub as it completes different phases of development in the next eight to 12 years.

"These hubs will pioneer the domestic consumption of hydrogen for decarbonisation of industrial processes, heavy-duty transport, power generation and long-term storage in the region," van Dorsten said. "Each hub is unique and will indicate how hydrogen deployment and adoption will expand throughout the rest of the US, along

major trade ways."

But Wood Mackenzie said the real momentum will come from private investment. The consultancy stressed the significance of creating the hubs but it pointed out that if the H2Hubs are fully developed by 2030, their combined production capacity will only contribute 30 per cent to the 10 tonnes per year (mtpa) hydrogen supply capacity objective, as outlined in the US National Clean Hydrogen Strategy and Roadmap.

"Yet due to the uncertainty of low-carbon hydrogen project announcements in the US, Wood Mackenzie only estimates around 4 mtpa of supply by 2030," the company said.

"Although Wood Mackenzie analysts expect low-carbon hydrogen supply to grow rapidly in the coming years, we don't anticipate all of the hydrogen hubs' capacity to have fully developed by 2030," Arreola added.

Furthermore, the consultancy's analysis shows that the goal of \$1/kg is currently out of reach for green hydrogen. This is largely due to higher renewable power costs, a slower decline

in capital expenditures for electrolytic hydrogen, and lower electrolyser load factor assumptions, it said.

The H2Hubs are to be scattered throughout the US in unique regions where each hub will address particular challenges. The regions are as follows:

■ Mid-Atlantic Hydrogen Hub (Mid-Atlantic Clean Hydrogen Hub (MACH2); Pennsylvania, Delaware, New Jersey).

■ Appalachian Hydrogen Hub (Appalachian Regional Clean Hydrogen Hub (ARCH2); West Virginia, Ohio, Pennsylvania).

■ California Hydrogen Hub (Alliance for Renewable Clean Hydrogen Energy Systems (ARCHES); California).

■ Gulf Coast Hydrogen Hub (HyVelocity Hydrogen Hub; Texas).

■ Heartland Hydrogen Hub (Minnesota, North Dakota, South Dakota).

■ The Midwest Hydrogen Hub (Midwest Alliance for Clean Hydrogen (MachH2); Illinois, Indiana, Michigan).

■ The Pacific Northwest Hydrogen Hub (PNW H2; Washington, Oregon, Montana).

Gas

Russia to boost gas supplies to China with favourable prices in years ahead

Russia and China have been strengthening their natural gas relations over the years. Russia has become a major natural gas supplier to China, including both pipeline gas and LNG. It is currently China's largest crude supplier.

Gary Lakes

Meeting in Beijing last month, Russian and Chinese leaders agreed on increases in the volume of natural gas that Russia's state-owned gas monopoly Gazprom will send to China this year. Having lost most of its gas market in Europe due to international sanctions brought about by Russia's invasion of Ukraine, Moscow has turned to China as a new major market. Furthermore, a new gas pipeline – the Power of Siberia 2 (or the Altai) pipeline – is on the drawing board and work on it may begin by mid-decade.

During a visit to China by Russian President Vladimir Putin in mid-October, Gazprom signed a deal with the China National Petroleum Corporation (CNPC) for the delivery of more Russian gas this year through the Power of Siberia gas pipeline. The deal is an addendum to the sale and purchase agreement covering gas

deliveries for 2023.

Russia and China signed the preliminary Power of Siberia gas pipeline deal in 2014 and the pipeline has been in operation since 2019. It has a capacity of 38 bcm/year and is expected to be transporting full volume to China by 2027.

Gazprom Chairman Alexey Miller said the company would ship an additional 600 million m³ to China during the remainder of 2023 in view of anticipated requests during the coming winter months.

"Daily requests are higher than the volumes stipulated by our contract," Miller told Russian TV last month. "We regularly deliver additional volumes to the Chinese market, and this is not the first year that we do it. This year I expect [additional volumes] at 600 million m³ of gas," he was quoted as saying. He added that Russia could soon supply China with volumes of gas comparable to those that were

once sent to Europe.

Prior to the start of the Ukraine war in February 2022, Russia provided roughly 40 per cent of all imported pipeline gas to the EU, amounting to around 155 billion cubic metres (bcm) in 2021, which accounted for about 45 per cent of Europe's total gas imports. However, Russia has since reduced its gas exports to the EU by some 80 per cent. But to maintain gas supply, the EU has been importing record volumes of LNG from Russia, with overall LNG imports up 40 per cent between January and July this year compared with the same period in 2021.

Russia's total gas exports to China amounted to 12.145 million tonnes in 2021, an increase of 51 per cent over the previous year. Of this, 7.54 million tonnes was pipeline gas (up by 154 per cent), and 4.6 million tonnes was LNG (down by 9.8 per cent), according to recent data released by

S&P Global.

"We see that the Chinese gas market is growing," Miller said during an interview last summer. "China's gas imports have increased over the eight months of this year. And more than half of the increase in these supplies imported to the Chinese market was provided by Gazprom."

Gazprom delivered an estimated 15 bcm of pipeline gas to China in 2022 and 2023 volumes are expected to reach 22 bcm.

According to a recent report in Bloomberg, China is paying \$297.30 per 1000 m³ for Russian pipeline gas this year, which is nearly half of what Gazprom is charging Europe for 2023 gas at \$500.60. For 2024, China is expected to pay an average of \$271.60 per 1000 m³ compared to \$481.70 for buyers in Europe and Turkey. That price is expected to remain in place through 2026.

Gazprom is also working on an

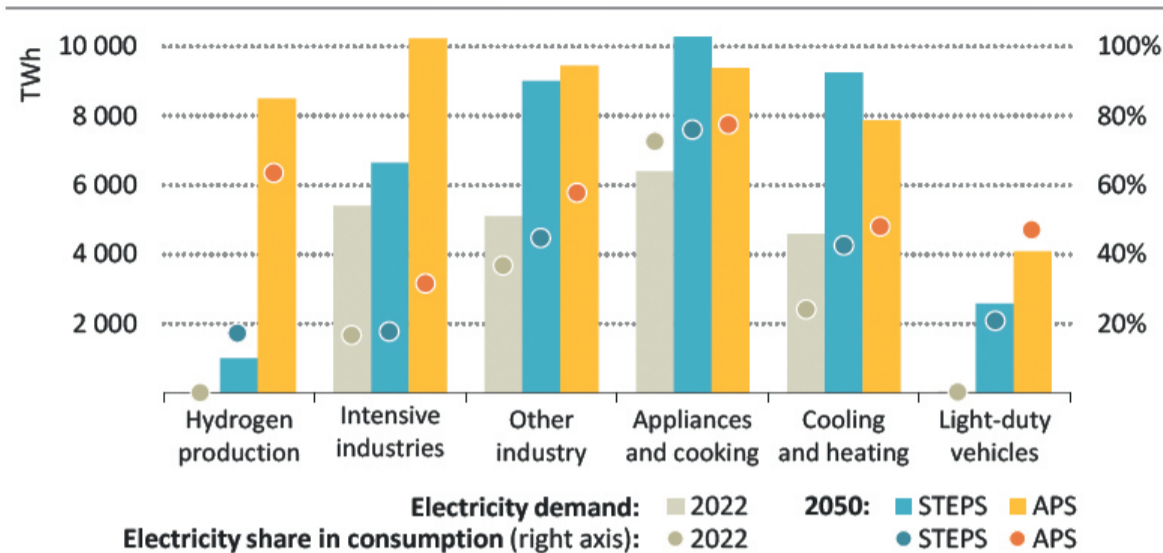
additional gas pipeline to China that will run through Mongolia, the Power of Siberia 2. Known also as the Altai pipeline, it is being designed with a capacity to carry 30 bcm/year a distance of 2800 km from western Siberia to northeastern China.

The Altai project has been on the table for a number of years but financing and environmental concerns have caused delays. There is also the fact that the sales and purchase agreement that would encourage construction of the project has yet to be signed by Russia and China.

When Putin was in Peking last month, Chinese President Xi Jinping told him that China is keen to work with Moscow to ensure energy security and would like to see substantial progress on the Altai project as soon as possible. The pipeline would take years to build and no prospective date for the start of operations has been mentioned.

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Global electricity demand and share of electricity in selected applications, 2022 and 2050



For more information, please contact:
IEA Publications
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Electricity plays an increasingly important role in many end-uses

Notes: Hydrogen production is the electricity needed for its production and the share of electricity in total energy consumed in the process of producing hydrogen. Intensive industries (energy-intensive industries) include iron and steel, chemicals, non-metallic minerals, non-ferrous metals, and paper, pulp and printing industries. Other industry includes the remaining industrial branches, i.e. construction, mining and textiles. Appliances and cooking includes stoves and ovens, refrigerators, washing and dishwashing machines, clothes dryers, brown appliances (relatively light electronic appliances such as computers or televisions) and other electric appliances (excluding lighting, cooling, cleaning and desalination). Cooling and heating include space and water heating, and space cooling in buildings.

World Energy Outlook 2023, © IEA/OECD, Figure 1.26, page 59

Primary risks associated with key clean electrification technologies

	Wind	Solar PV	Nuclear	Battery storage	Demand response	Grids	Electric vehicles	Heat pumps
Regulatory and policy risks								
Regulatory frameworks	Medium	Low	Medium	Medium	High	Medium	Medium	Medium
Policy support	Low	Low	Medium	Low	High	Low	Low	Low
Permitting and certification	Medium	Medium	High	Low	Low	High	Medium	Low
Supply chain risks								
Critical minerals	High	Medium	Low	High	Low	Medium	High	Low
Manufacturing	High	Low	Medium	Medium	Low	Low	Low	Medium
Skilled labour	Medium	Medium	High	Low	Low	High	Low	Medium
Financial risks								
Costs of financing	High	Medium	High	Medium	Low	High	Medium	Medium
Revenue and savings predictability	Medium	Low	Low	Medium	Medium	Low	Low	Low
Overall risks	High	Low	Medium	Medium	Medium	High	Low	Medium

Note: Grids refers to electricity networks, including transmission and distribution.

World Energy Outlook 2023, © IEA/OECD, Table 1.1, page 60

Tuning Europe's electricity grids for a PV revolution

The path to renewables integration is not short of obstacles. Yet current plans do not reflect the speed at which the system is decentralising and are not explicit enough on the need to invest more in the distribution grid. Eurelectric's **Kristian Ruby** says a forward-looking mindset is crucial to enable Europe's grid infrastructure expansion and modernisation.

If you came to Brussels 15-20 years ago you could meet electricity industry representatives claiming that as little as three per cent of variable renewables in power generation would cause a breakdown of the system and be a huge liability for security of supply. Thankfully, much has changed since. Today, there is broad consensus that home-grown renewable energy – with the proper backing of firm and flexible solutions – are key to reduce fossil fuel imports and secure a reliable supply to power Europe's economy.

At the same time, the backdrop of the energy transition has radically evolved. Last year, EU countries were shaken by one of the hardest energy and price crises to date. While geopolitical tensions heightened, the continent moved from an historically low to a high inflation environment. Meanwhile, more frequent extreme weather events combined with growing security and cyber threats keep challenging our efforts towards climate mitigation.

We now live in a less secure world with a severe strain on our energy security, which calls for an even higher commitment to the decarbonisation of our continent. The EU has so far led the way by adopting more ambitious renewables and decarbonisation targets. Doubling down on decarbonisation means doubling up on electricity. By 2030, we will need a tripling of heat pumps to around 50 million units, a quadrupling of renewables adding over 600 GW of capacity across Europe, of which almost 70 per cent will be directly

Ruby: Doubling down on decarbonisation means doubling up on electricity



Grid investments need a massive push

connected to the low-voltage distribution grid. And to serve the expected 50-60 million EVs, we will need to increase public EV charging points by a factor of seven. What used to be a steady state system is thus moving into a strong expansion phase.

The path to renewables integration is not short of obstacles. Each year, system operators receive more and more connection requests from decentralised assets, including rooftop solar photovoltaics (PVs), EVs and heat pumps. In 2022, these requests increased by around 20 per cent from the previous year and are set to skyrocket in future years, shows Eurelectric's 'Power Barometer 2023'. Some DSOs report an eight-fold increase in the amount of received connection requests.

Building more lines and substations are a must to handle flows of the future system, but it takes a long time due to lengthy planning and permitting, causing congestion in the grid in the short term. As a result, installations costs for renewable systems are going up. We need concrete action to get our infrastructure ready to secure energy supply in the age of net zero.

As the guiding documents to inform infrastructure investments and orient renewables project developers, network planning must become more renewable-focused shows our recent analysis 'Solar Connection'.

Back in 2021, Eurelectric estimated that Europe's electricity distribution network needed a significant investment push to accommodate the projected growth of renewables. With today's growth of more than 40 per cent year on year in new PV installations, grid investments need a massive push and should increase up to €65 billion per year until 2050 to accommodate the accelerating electrification rate. As a rule of thumb, Europe should invest €0.65 in the grid for every €1 invested in generation capacity. Today, that figure is

closer to €0.30.

Current plans are not sufficiently reflecting the speed at which the system is decentralising and are not explicit enough on the need to invest more in the distribution grid. A forward-looking mindset is crucial to enable Europe's infrastructure expansion and modernisation – for example, via anticipatory investments –

however, could be much improved.

Flexibility needs should be better assessed by clearly mapping where the different sources of flexibility are located, including prosumers. Once mapped, flexibility should be streamlined at all stages of grid operations.

During the connection phase, flexible connection agreements should be incentivised as possibilities to get a

“Building more lines and substations are a must to handle flows of the future system, but it takes a long time due to lengthy planning and permitting, causing congestion in the grid in the short term”

while mapping and assessing the flexibility needed to optimise the grid capacity already available.

Grid connection rules within and across EU countries vary significantly, especially at the low-voltage level. Standardising these rules with automated, digitalised and harmonised processes would simplify and speed up connections. To this end, Member States need to clearly define procedures, outline timetables and clarify the roles of relevant stakeholders by establishing national rulebooks, and develop accountability for respecting such timelines.

The possibility of energy consumption or production to adapt to system stress is another immediate solution to balance variable generation connecting to the grid. Several enablers of flexibility already exist such as smart inverters located in the PV system that can modulate the electricity sent to the grid, smart EV batteries that can store and release power to the grids at times of peak demand as well as smart home management systems that interact bi-directionally with the grid. Their contribution,

faster plug-in to the grid in a congested area by limiting an asset's capacity in need of connection to an agreed percentage based on the grid's needs. During operation, flexibility could also be fostered via market-based price signals in local flexibility markets. Above all, regulators must allow system operators to procure flexibility services as one of the possible options for managing the grid, providing clear incentives and key performance indicators (KPIs) for flexibility enhancement.

Although many of the challenges discussed are local in nature, the European Commission can also play a role in enabling the electricity grid of the future. EU institutions should provide a governance framework, incentivise proactive investments and identify best practices in their upcoming European Grid Action Plan. An electricity grid fit for the future speed is a critical requirement to steer Europe through the increasingly complex energy transition.

Kristian Ruby is Secretary General at Eurelectric



Nuclear is not just technology

Both developed and developing countries have taken an interest in expanding their energy sources to include nuclear power. **George Borovas and Inna Pletukhina** of law firm **Hunton Andrews Kurth LLP** share their insights on the key things countries newly setting out on the nuclear power pathway should consider.

The direction of the conversation about “nuclear” varies greatly depending on the interlocutor. If we are talking to the general population, the discussion may range from concern about nuclear accidents and spent fuel management to optimism about nuclear being the key to mitigating climate change. With financial institutions, the conversation about investment into a new national nuclear power programme or an innovative technology evolves into evaluation of potential reputational, construction, project management and other risks. At the various international conferences, whether those hosted by the International Atomic Energy Agency (IAEA) or the World Nuclear Association (WNA), nuclear echoes from the stage, corridors and coffee tables as the policy solution to the climate change and energy security challenges. The advanced reactor technology companies mention concerns about both financing and regulatory approvals. When we sit across the table – or now increasingly across the screen and several time zones – from so-called newcomer countries, the conversation usually revolves around technology choices.

Technology is the first issue raised by the decision makers that are considering introducing nuclear power as part of their national energy mix. As a starting point, technology selection can point out the path to meeting a specific energy demand, estimating associated costs and selecting a potential vendor. Technology can be analysed from the perspective of safety features, built-in security measures and safeguards against proliferation. The operating experience of a reference plant can be analysed, learned from and, ultimately, adapted to the local site and national context. It may be possible, even, to visit a reference plant. Technology is tangible.

But the tangibility of technology

frequently obscures the other less tangible variables essential for a successful new nuclear power programme. Whether the country is establishing a new nuclear power programme utilising a conventional nuclear power reactor or deploying small modular reactor technology, the IAEA advises a newcomer country to consider 19 infrastructure issues as it moves across three developmental phases and crosses three milestones. The IAEA Milestone Approach is an invaluable tool, which helps organise the many complex national processes, activities and decisions. The IAEA Milestone Approach expands the national nuclear “to-do” list. Starting from formulation of a national position to development of a comprehensive nuclear law, to stakeholder engagement and coordination and human resource development, the IAEA Milestone Approach highlights the less tangible considerations in a comprehensive and sequential manner; and goes beyond the selection of technology. By following the IAEA Milestone Approach a newcomer country would establish a solid foundation for a successful national nuclear power programme.

While the infrastructure foundation is an essential requirement for a national nuclear power programme, it is not sufficient for the success of a new nuclear power project. From a commercial perspective, the success of a new nuclear power project requires a mindset shift. The ultimate goal of the selection of technology, the expenditure of certain funds and of the overall improvement of the national nuclear infrastructure in the 19 areas identified by the IAEA, is electricity!

It seems obvious to state that the ultimate goal of a national nuclear power programme or new project is electricity (or high-temperature steam, hydrogen or whatever other output may be desired from a nuclear reactor). However, shifting perspective toward the ultimate goal of electricity through powerlines, shifts the approach to the commercial process of obtaining it. Now, the conversation is less about the specific and tangible aspects of technology, but rather about all these other factors that successfully electrify the grid.

First, when a country is developing a national nuclear power programme and procuring its first nuclear power project, the consideration that is often overlooked is that of a relationship with a vendor. Establishing a new nuclear power programme and commissioning a first nuclear power plant can take over a decade. Operation and maintenance, as well as eventual decommissioning of the plant, extend the timeline of the relationship to approximately 100 years. The most successful nuclear power project is built on a partnership between a newcomer country/owner and a vendor that can endure for that time period.



Borovas: As a starting point, technology selection can point out the path to meeting a specific energy demand, estimating associated costs and selecting a potential vendor

What we recommend to nuclear newcomer countries is to engage with vendors after establishing that national vision of what precisely the country is trying to achieve. It is in these conversations that keeping the mindset focused on the larger goal, rather than purely technology, is the key to a successful nuclear power project. These conversations should focus on how that vendor can help achieve the specific national objective, what can they offer in addition to the specific technology and whether they would be a good partner to travel that long and challenging path of a new national power programme. Approach to project management, resolution of disputes and capacity building to localise a newcomer country’s ability to operate and maintain the nuclear power plant are among the variables that must be considered in determining whether to form the partnership.

Second, in the industry vernacular, contracts for large energy projects are described in terms of the amounts, i.e., a “\$20 billion contract”. Frequently, a country allocates a certain amount to “pay for a contract”. However, referring to the “cost of a contract” is misleading. The “cost of a contract” means very little without the precise allocation of risks between the newcomer country/owner of the new nuclear project and the vendor/contractor. The contract is like a roadmap that foresees various eventualities and suggests approaches to deal with them, dividing the responsibilities (and financial liabilities). Without such allocation of responsibilities and liabilities to specific parties for eventualities – like change in local laws, unexpected site conditions, high-turnover of personnel – the cost of the project for the owner may increase drastically and, indeed, the overall “cost of a contract” may be unpredictable.

Engaging vendors/contractors in advance of procurement can give

newcomer countries a glimpse into what the “cost of a contract” actually includes, and what the less tangible benefits of this long-term partnership may be. Again, it is in these conversations and cost negotiations that focusing on the larger goal of the entire nuclear power project, i.e., electricity to the grid (or high-temperature steam, etc.) is necessary. Keeping in mind that the goal of the project is more than a power reactor structure of a particular design for a certain amount of money, can help the newcomer country/owner trade off various desired, intangible benefits and necessary costs in a more optimal manner.

The process of establishing a new nuclear power programme ripples through the economic and social fabric of a country. A national nuclear power programme and a new nuclear power project allow sustainable and clean electricity to reach remote communities and industrial facilities, which may be key to economic and social development. The improvement of physical infrastructure around a country, strengthening of legal and regulatory frameworks, increasing education and capacity building in the sciences, policy, economics, administrative management and law, are also outputs of a national nuclear power programme. Reducing a nuclear power programme to a choice of technology undermines the success of the procurement process for the new nuclear power project, just as reducing the conversation about “nuclear” to a specific set of issues obscures its many benefits. The beauty of a national nuclear power programme and a first nuclear power project is their potential to transform an entire country and society.

George Borovas is Head of Hunton Andrews Kurth LLP Nuclear practice; Inna Pletukhina is Associate on the Energy and Infrastructure team.



Pletukhina: Engaging vendors/contractors in advance of procurement can give newcomer countries a glimpse into what the “cost of a contract” actually includes

Unlocking the power of AI in asset aggregation



AI algorithms can precisely determine when to charge and discharge batteries

The global energy landscape is in the midst of a remarkable transformation, with a resolute focus on sustainability and the integration of renewable energy sources. In the UK, this paradigm shift towards cleaner energy necessitates innovative solutions. **GridBeyond** believes one promising avenue lies in the convergence of artificial intelligence with distributed energy systems, a synergy that has the potential to revolutionise the management and optimisation of our energy resources.

Artificial intelligence (AI) has garnered significant attention across various industries. But where it truly shines in terms of delivering value is in operation and optimisation of energy assets, particularly distributed energy assets such as battery storage, smaller-scale renewables, and industrial demand management.

In the context of energy, AI-driven optimisation algorithms already play a pivotal role in balancing supply and demand, ensuring the efficient utilisation of energy assets. Take, for instance, battery storage, AI algorithms can precisely determine when to charge and discharge batteries to maximise their lifespan and minimise energy costs. Similarly, AI can support the optimisation of smaller-scale renewables by predicting weather patterns and adjusting trading strategies accordingly.

But AI's potential extends well beyond individual energy assets. It is a key catalyst behind the rapid expansion and effectiveness of microgrids and distributed energy resources (DERs). AI empowers these systems to implement demand response programmes, enhances their capacity to manage diverse energy resources, and adapts to ever-evolving conditions.

The UK, known for its intermittent

weather patterns, stands to benefit significantly from the integration of AI with such systems. AI's ability to predict cloudy days or periods of low wind enables it to pre-emptively draw from energy storage systems during such times, ensuring a consistent energy supply even when renewable sources are temporarily unavailable. Conversely, microgrid systems have the potential to take advantage of downward market movements when surplus renewables are abundant.

The real benefit comes when you utilise AI to forecast data from multiple sources, including weather forecasts, electricity prices, and energy consumption patterns, to make real-time decisions. This capability becomes especially valuable when applied to issues that demand decisions within milliseconds, such as the dynamic pricing of energy in traded markets. The majority of energy trading takes place in long-term markets (month-ahead, year-ahead) between suppliers and generators, refining in spot or short-term markets (day-ahead, intraday). Following this, grid operators step in to balance supply and demand in flexibility and reserve markets.

However, participating in grid services and energy markets requires a certain scale that many distributed

energy resources lack. In the UK, aggregated units must be physically located within the same grid supply point (GSP) area, presenting market access and locational challenges. As microgrids continue to expand and become integral components of modern energy systems, AI's role in their success becomes even more crucial for the management and aggregation of these smaller units. Individually, smaller sub-1MW units may offer minimal frequency response value, but when aggregated, their potential can be significant.

Yet, blending distributed resources to meet scale requirements is not without its challenges. One of the primary adaptations in applying AI and machine learning to microgrids and distributed energy resources (DERs) is the need to scale down algorithms and models. A pivotal aspect of this adaptation involves the real-time monitoring of a network of individual assets with different characteristics and operating requirements.

Over five years ago GridBeyond launched its hybrid battery and demand network, which to this day provides a portfolio of battery and demand assets working in harmony to provide flexibility to the grid, whilst enabling inflexible sites to access the fastest responding (and most financially rewarding) balancing services.

In this type of network, a battery is used not only as energy storage but as a tool to unlock untapped flexibility for demand side response (DSR) participation on-site and within the network. There are many demand side assets suitable to creating this kind of network. By adding a battery, the hybrid network becomes more robust, making its overall level of energy flexibility and storage capacity greater than the sum of its parts.

GridBeyond estimates that this hybrid technology has increased flexibility of its clients by over 65 per cent. This means, with a relatively small investment (when compared to the prices of large batteries alone), the value of the clients' assets can be significantly increased by bringing both the benefits of optimised storage and increased flexibility.

On September 1, 2023, GridBeyond marked a further milestone in asset aggregation behind the meter, announcing that it is actively bidding an aggregation of three behind-the-meter battery systems into National Grid ESO's new dynamic services (Dynamic Containment (DC), Dynamic Moderation (DM), Dynamic Regulation (DR)). Using the structures and the rules in place, GridBeyond's first aggregated DC/DM/DR unit aims to prove that behind-the-meter distributed storage can be an asset to the system while delivering significant value.

But tying together distributed resources to meet these scale requirements is both a technical and a policy challenge. First, you have to prove that lots of independently located and controlled systems can respond as a unit. Second, you have to create the grid programmes and market mechanisms that permit these aggregated resources to play the roles this capability opens up to them.

"The journey to this point was not without difficulty" commented Seamus King, GridBeyond's Head of Trading. "We have faced numerous obstacles we have needed to tackle, included but not limited to dealing with different frequencies at different sites, testing at a set time across different sites, managing different import/export agreements, varying site loads, getting the correct response from different assets within one unit and aggregating different types of batteries together (model, capacity etc.). Had it not been for the capability of our engineering department, today's market go-live would not have been possible."

The fusion of AI with DERs and microgrids represents a leap in the ability to efficiently manage energy resources, lower costs, and reduce carbon footprint.

As the UK strives to meet its ambitious clean energy goals, AI's role in aggregating and optimising distributed energy assets will be instrumental in reshaping the energy landscape and propelling us towards a more sustainable and resilient energy future. It is the synergy of technology and clean energy that promises to shape the energy landscape for generations to come.

By adding a battery, the hybrid network becomes more robust





Junior Isles

It's time to get onside

The recent launch of the International Energy Agency's 'World Energy Outlook' (WEO) had an audience of 70 000 viewers worldwide – “maybe bigger than a major Champions League match”, according to IEA Executive Director, Dr Fatih Birol. And with all eyes focused on the COP28 climate summit, the turnout was hardly surprising.

The launch of the Paris-based agency's annual flagship publication was slightly earlier than usual – timed to feed into the difficult negotiations expected at the summit in Dubai in just a few weeks.

Commenting on the timing and the upcoming talks, Dr Birol said: “One of the reasons we decided to publish this World Energy Outlook earlier than usual, is with the hope to provide a basis for the decision makers going to Dubai... this COP28 is as critical as the COP21 in Paris.”

WEO 2023, like almost every report since the 2015 Paris Agreement, again notes that much stronger policies are needed to limit global warming to the 1.5°C temperature rise agreed by world leaders eight years ago.

For COP28 to be considered successful, Dr Birol said the IEA has five criteria: it would like to see governments agree to triple renewable capacity between now and 2030 and double the improvement of energy efficiency globally by 2030; see oil and gas companies commit to climate targets by taking emissions reduction measures, including a major reduction in

methane emissions of 75 per cent by 2030; the advanced economies and international financial institutions create the financial mechanisms to support clean energy development in developing countries; and finally, that governments agree to take measures for an “orderly decline” of fossil fuel use, including an end to the building of new unabated coal fired plants.

It is a long wish list; one that is not without major underlying challenges. Taking the first point, agreeing to triple renewable capacity is just the tip of the iceberg. Connecting it all to the grid is likely to be an even bigger obstacle.

Just a week before the launch of WEO 2023, the IEA released a special report, which stressed that efforts to tackle climate change and ensure reliable supplies of electricity could be put at risk unless policy makers and companies quickly take action to improve and expand the world's electricity grids.

Issues are already emerging. The report identifies a large and growing queue of renewables projects waiting for the green light to be connected to the grid, pinpointing 1500 GW worth of these projects that are in advanced stages of development. This is five times the amount of solar PV and wind capacity that was added worldwide last year.

With regards to the phase-out of fossil fuels, the problems are more political than technical. Reacting to tensions with the west following its invasion of Ukraine, Russia recently

warned that it will oppose a deal to reduce the use of fossil fuels at COP28.

In a submission to the UN's climate body, Russia said: “We oppose any provisions or outcomes that somehow discriminate or call for phase-out of any specific energy source or fossil fuel type.”

Despite more than 80 countries supporting a proposal at COP27 in Egypt last year to gradually eliminate fossil fuels, Russia's buy-in is crucial. The country is the third-largest crude producer.

As the heart of the oil and gas sector, the Middle East must also get on board. And here, Sultan al-Jaber, Head of the Abu Dhabi National Oil Company, one of the world's biggest oil and gas groups, has a pivotal role to play. Crucially, Jaber is also President-designate of this year's UN climate summit and his task will be to bring the opposed sides together. He is perhaps uniquely placed, at the perfect time, to act as the much needed catalyst.

Speaking to the *FT* at the Abu Dhabi International Petroleum Conference last month, Jaber said: “We've had 27 COPs. Please let me deliver something tangible this time.”

If ever there was a time to go for goal, it is now. Laura Cozzi, the IEA's Director of Sustainability, Technology and Outlooks, and who is one of the lead authors of the WEO, noted that the IEA's projections imply that, under current policies, global emissions will peak in 2025. She stressed, however, that this does not translate

to any cooling.

“2023 is set to be the hottest year recorded in human history... it will be the coolest of the years we will see throughout [the rest of] this century. Even if emissions peak and start declining, without additional climate policies we will break record temperatures year after year, after year. The only way to stop temperatures from rising is to actually get to net zero emissions,” she said.

Yet it seems that limiting global warming to 1.5°C is less likely than ever. According to DNV's latest ‘Energy Transition Outlook’, to reach the goals of the Paris Agreement, CO₂ emissions would need to halve by 2030. It forecasts, however, that this will not even happen by 2050. CO₂ emissions will be only 4 per cent lower than today in 2030 and 46 per cent lower by mid-century. Energy related CO₂ emissions are still hitting record highs and are only likely to peak in 2024, which is effectively the point at which the global energy transition begins.

The IEA still believes that although the path to limiting the global temperature rise to 1.5°C has narrowed, clean energy growth is keeping the window open. An update of the Paris-based agency's landmark ‘Net Zero Roadmap’ shows greater ambition and implementation, supported by stronger international cooperation, will be critical to reach climate goals.

Commenting on the update to the original report published in 2021, Birol said: “Keeping alive the goal of limiting global warming to 1.5°C requires the world to come together quickly. The good news is we know what we need to do – and how to do it. Our 2023 ‘Net Zero Roadmap’, based on the latest data and analysis, shows a path forward. But we also have a very clear message: strong international cooperation is crucial to success. Governments need to separate climate from geopolitics, given the scale of the challenge at hand.”

And so the stage is set for Dubai. Although as critical as COP21, the outcome of COP28 hangs in the balance – largely due to the current geopolitical environment and the increasing global discord.

“When I compare the conditions at COP21 compared with those of today, there are definitely some advantages and disadvantages of the current context,” said Dr Birol. “In Paris in 2015, there was a mood of international cooperation among the countries to find a solution to the common problem of the climate crisis. When we look at today and COP28, the single most important challenge is that we see international fragmentation.”

“But of course there are also advantages today. We have readily available clean energy technologies that are cost-effective – solar, wind, electric cars, nuclear power, energy efficiency. We just need to expand them as strongly [as possible]. When we had Paris, many of those technologies were just at the beginning of being competitive and had small shares in the global energy mix. So there are pluses and minuses. But at the IEA, we will do everything we can in order to have a good outcome from COP28.”

Certainly this is one Champions League match where all players have to get onside. The time for kicking the ball into the long grass and hoping for the best has long gone.



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