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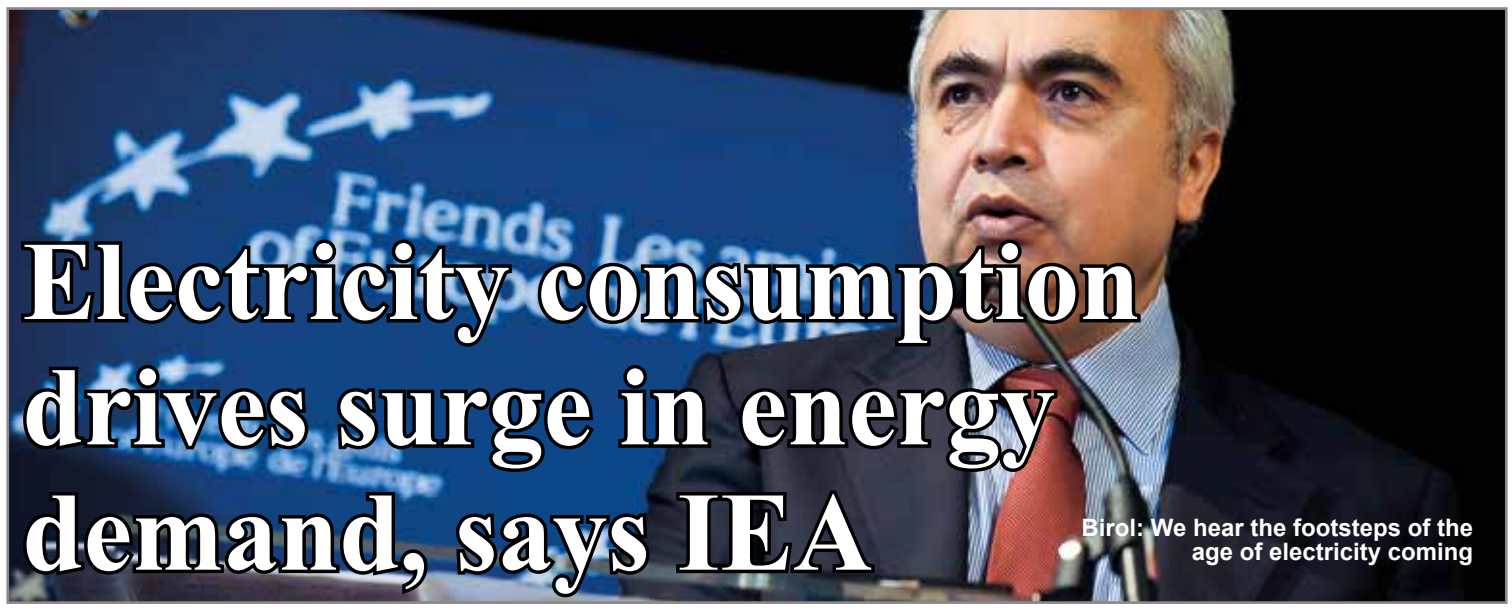


# Electricity consumption drives surge in energy demand, says IEA

Birol: We hear the footsteps of the age of electricity coming

Growth in energy demand doubled last year compared to the 10-year historical average, with electricity demand being the main driver, according to a new International Energy Agency report. **Junior Isles**

Electricity demand is driving a resurgence in energy demand, according to a new report by the International Energy Agency (IEA).

The latest edition of the IEA's 'Global Energy Review' – the first global assessment of 2024 trends across the energy sector – revealed that global energy demand grew at a faster-than-average pace in 2024, with increased supply of renewables and natural gas covering the majority of additional energy needs.

The report finds that global energy demand rose by 2.2 per cent last year – lower than GDP growth of 3.2 per cent but considerably faster than the average annual demand increase of 1.3 per cent between 2013 and 2023.

Emerging and developing economies accounted for over 80 per cent of the increase in global energy demand in 2024. This was despite slower growth in China, where energy consumption rose by less than 3 per cent, half its 2023 rate and well below the country's recent annual average. After several years of declines, advanced economies saw a return to growth, with their energy demand increasing by almost 1 per cent in aggregate. The European Union witnessed an energy demand increase for the first time since 2017, according to the IEA.

During the launch of the report, IEA Executive Director Fatih Birol, said: "Global energy demand has grown two times faster than historical averages. In the last 10 years, global energy demand increased about 1 per cent; in 2024 it increased by more than 2 percentage points. This is yet another example that energy demand is growing, but electricity demand increases two times higher than the energy demand growth. We hear the footsteps of the age of electricity coming."

The acceleration in global energy demand growth in 2024 was led by the power sector, with global electricity consumption surging by nearly 1100 TWh, or 4.3 per cent. This was nearly double the annual average over the past decade.

The sharp increase in the world's electricity use last year was driven by record global temperatures, which boosted demand for cooling in many countries, as well as by rising consumption from industry, the electrification of transport, and the growth of

*Continued on Page 2*

# Fresh push for nuclear to meet growing energy demand

The US has called on the World Bank to end a decades-old ban on funding nuclear power in order to help the west compete with China and Russia, as countries and industries around the world look to nuclear to meet their growing energy needs.

French Hill, Chair of the House Financial Services Committee, has signalled that the new US administration will continue to support the push to fund nuclear projects just months ahead of a crucial decision on the ban.

Hill told the *Financial Times* that World Bank chief Ajay Banga had US backing to end the ban, as the world's biggest development fund moves closer to embracing nuclear energy in lending to emerging markets.

"We support both the export of this technology and a much more broad-based approach to financing it," Hill told the *FT*.

The World Bank has not financed nuclear power since the 1950s. But it could bring the technology back into the fold within months after a review of energy policies under Banga, people familiar with the matter said.

Early last month Banga signalled his willingness to reconsider nuclear technology in an address to the European Commission. Germany and a handful of smaller European countries have traditionally led opposition to nuclear power as World Bank shareholders.

The US is especially keen for the topic to be revisited, underscoring alarm in Washington that Beijing and Moscow are winning a race to build a new generation of nuclear plants in Africa and Asia.

"I'm in constant discussions with other governments who are extremely interested in expanding nuclear, but they can't get the attention of anyone in western countries," Hill, a Republican representing Arkansas, said.

Banga has led efforts in the bank to consider how it might factor in technologies that could make nuclear power cheaper, such as small modular reactors, people familiar with his thinking said.

The US government's call on the World Bank came as Amazon, Google and Meta joined a call by big, energy-intensive companies for governments and utilities to build more nuclear power.

Oil group Occidental and chemical producer Dow are also among the eight large buyers of energy to sign a pledge to support the goal of tripling nuclear capacity by 2050. The statement was co-ordinated by the World Nuclear Association.

The show of support follows a similar pledge in September by 14 of the world's biggest financial institutions, including Goldman Sachs, Bank of America, Barclays and Morgan Stanley, to increase their support for the sector and back a call made at the COP28 UN climate conference for nuclear power to be tripled by 2050.

Urvi Parekh, head of energy at Meta, said the company had backed the pledge because it believed the challenge of building expensive nuclear plants required significant coordination between developers, utilities, governments and power consumers.

Amazon said it has invested more than $1 billion in the nuclear industry in the past year and speeding up new power stations would be "critical" for US security, meeting growing energy demands and helping combat climate change.

Continued from Page 1

data centres and artificial intelligence (AI).

The expanding supply of low-emissions sources covered most of the increase in global electricity demand in 2024. The amount of new renewable power capacity installed worldwide rose to around 700 GW, setting a new annual record for the 22nd consecutive year. Nuclear power capacity additions reached their fifth highest level in the past three decades.

As a result, 80 per cent of the increase in global electricity generation in 2024 was provided by renewable sources and nuclear, which together contributed 40 per cent of total generation for the first time. The supply of natural gas-fired generation also increased steadily to cover rising electricity demand.

As a result of higher power consumption, natural gas saw the strongest increase in demand among fossil fuels in 2024. Gas demand rose by 115 billion cubic metres (bcm), or 2.7 per cent, compared with an average of around 75 bcm annually over the past decade.

Meanwhile, oil demand grew more slowly, rising by 0.8 per cent in 2024. Oil's share of total energy demand fell below 30 per cent for the first time ever, 50 years after it peaked at 46 per cent. Sales of electric cars rose by over 25 per cent last year, with electric models accounting for one in five cars sold globally. This contributed considerably to the decline in oil demand for road transport, which offset a significant proportion of the rise in oil consumption for aviation and petrochemicals.

Global coal demand rose by 1 per cent in 2024, half the rate of increase seen the previous year. According to the report, intense heatwaves in China and India – which pushed up cooling needs – contributed more than 90 per cent of the total annual increase in coal consumption globally, highlighting the major impacts extreme weather can have on energy demand patterns.

The continued rapid adoption of clean energy technologies limited the annual rise in energy-related carbon dioxide ($CO_2$) emissions, which are increasingly decoupling from economic growth, according to the report. Record temperatures contributed significantly to the annual 0.8 per cent rise in global $CO_2$ emissions to 37.8 billion tonnes. But the deployment of solar PV, wind, nuclear, electric cars and heat pumps since 2019 now prevents 2.6 billion tonnes of $CO_2$ annually, the equivalent of 7 per cent of global emissions.

$CO_2$ emissions in advanced economies fell by 1.1 per cent to 10.9 billion tonnes in 2024 – a level last seen 50 years ago, even though the cumulative GDP of these countries is now three times as large. The majority of emissions growth in 2024 came from emerging and developing economies other than China. Though emissions growth in China slowed in 2024, the country's per-capita emissions are now 16 per cent above those of advanced economies and nearly twice the global average.

"From slowing global oil demand growth and rising deployment of electric cars to the rapidly expanding role of electricity and the increasing decoupling of emissions from economic growth, many of the key trends the IEA has identified ahead of the curve are showing up clearly in the data for 2024," Dr Birol said.

# EU to fill gap in Just Energy Transition financing after US withdrawal

Europe is doubling down on its support for the energy transition following the US' withdrawal from the Just Energy Transition Partnership.

Junior isles

The European Union has moved to fill a funding gap in a climate financing programme set up to support the energy transition plans of various developing countries, following the withdrawal of Donald Trump's administration from the programme.

Last month, the US said it was withdrawing from the Just Energy Transition Partnership (JETP), launched in 2021 to help South Africa, Indonesia and Vietnam switch from coal to renewable energy. The US, along with the UK, France, Germany and the EU pledged $45 billion to the initiative.

South Africa's JETP unit, which sits under the presidency, said the US withdrawal reduced the overall pledges to the country from $13.8 billion to $12.8 billion. The US had pledged $56 million in grant funding, and $1 billion in potential commercial investments.

Speaking to the *Financial Times*, Dion George, South Africa's Minister of the Environment, fisheries and forestry, said all the other countries remain committed to the partnership. A new commitment obtained from the EU will fill part of the gap, he said. "The EU committed €4.7 billion to South Africa for a number of projects, and this includes for the just energy transition, so this will help fill the gap."

European Commission President Ursula von der Leyen said the €4.7 billion ($5.1 billion) would be used in part to shore up the just energy transition project and for green energy.

Referring to the US, von der Leyen said: We know others are withdrawing but the EU wants to be very clear with our message: we are doubling down with our support. We are here to stay."

In a letter sent to South Africa's government, seen by the *FT*, the former US chargé d'affaires Dana Brown said Trump's executive order, which calls for putting America first in international deals, "revokes and rescinds the US international climate finance plan issued by the previous [Joe Biden] administration".

Brown wrote, "effective immediately, the US is no longer a member of the international partners group for the just energy transition partnerships for Indonesia, South Africa and Vietnam" and "all associated financial pledges are also withdrawn".

Commenting on the US withdrawal Shah Jahan Khandokar, energy and infrastructure partner at law firm McDermott Will & Emery, said: "Whilst US withdrawal from various bilateral and multilateral programmes may initially be seen as detrimental for various renewable energy initiatives, the US has made clear in recent days, most notably during an African climate summit in Washington DC on March 7th, that the US is still open for business on the continent and elsewhere. African leaders were told that US withdrawal from such programmes is not the same as US isolationism. Rather, governments need to ensure that if they would like US (private and public sector) support, they need to prioritise projects, be they renewable or otherwise, that demonstrate a true partnership with the US, rather than a reliance on US subsidies.

"In the context of South Africa, Indonesia, and Vietnam, those countries themselves will need to ensure they focus on moving away from coal (if that is what they wish to do) and put in place the correct incentives to induce private sector to invest in renewable and low-carbon technology projects. Our experience (and specifically through working on various JETP projects) in those countries has shown they are well placed and prepared to do so."

Tracey Davies, Executive Director of South African non-profit Just Share, said that if anything, Washington's departure from the programme may be positive for the energy partnership.

She told the *FT*: "If America had stuck around and been obstructive, this could have slowed things down further. So in a sense, its absence could be positive for climate financing."

Davies says the bigger risk may be at a diplomatic level, where countries risk compromising their climate goals to appease the US.

The news came as Ministers from Africa, Asia, Latin America and the Caribbean, and the Pacific recommitted to exploring collaborative opportunities to accelerate a just and equitable energy transition.

At two Ministerial gatherings at the SEforALL Global Forum in Barbados last month, ministers from 28 countries also spoke of advancing climate resilience for populations in the Global South.

"The two ministerials highlight the importance of working together to bridge energy access gaps, fostering economic development, and ensuring that the energy transitions in developing nations align with global climate goals under the Paris Agreement," said Senator the Hon. Lisa Cummins, the Chair of the SIDS Ministerial and Co-Chair of the Global Ministerial, Minister for Energy and Business for Barbados. "We now need to move from commitments to action, creating lasting change globally,"

# EU sends mixed signals on climate policy, as $CO_2$ levels hit new high

The EU's recent package of green and industrial policy announcements has been viewed as sending mixed signals about its dedication to climate policy.

In early March, Brussels outlined proposals for a softer approach to policing state subsidies as it unveiled guidelines that will allow member states to keep pouring cash into cleantech investments until the end of the decade.

The new state aid framework is a pillar of the EU's Clean Industrial Deal, unveiled in late February, which attempts to balance the bloc's climate goals and efforts to improve its flagging competitiveness.

To meet those goals, Brussels will allow European countries to fund investments that cut emissions, such as industrial decarbonisation projects and renewable energy products. However, the subsidy limits for cleantech manufacturing are lower than during the pandemic and subsequent energy crisis, according to the draft.

Teresa Ribera, the EU's competition chief who is responsible for overseeing state aid enforcement, told the *Financial Times* the rules attempted to follow the "fine line" between "a story of growth and protection of consumers and at the same time a well-functioning, transparent and balanced single market".

The guidelines come against a backdrop of rising global temperatures. Last month, UN research that found 2024 was likely to have been the hottest year on record and the first to surpass 1.5°C above pre-industrial levels. The concentration of carbon dioxide in the atmosphere is now at its highest point in 800 000 years, according to the UN.

In an annual assessment of the climate, the UN's World Meteorological Organization said the global average surface temperature was 1.55°C above the 1850-1900 level, with a 0.13°C margin of uncertainty either way – making last year the warmest in a 175-year observational record, according to the research, which draws together data from member countries and partner agencies.

"Our planet is issuing more distress signals," said UN Secretary-General António Guterres, urging world leaders to step up climate action.

# Faith in hydrogen appears to be faltering

Faith in the nascent hydrogen economy appears to be faltering, as some companies re-assess their commitment to rolling out the technology.

Hydrogen, which emits no carbon dioxide during combustion, has been identified as having a key role in decarbonisation, but there are now signs the technology is facing headwinds.

Australia's Queensland state government last month said it rejected a request from a state-owned electric power company for more than A$1 billion ($630 million) of additional investment in a hydrogen project in the eastern Australian state. Japanese trading company Marubeni Corp. is also involved in the project.

David Janetzki, Queensland's Energy Minister, told the local media that the investment in the project is not in line with expectations of providing sustainable and affordable electricity to residents.

The project involves producing and using green hydrogen, produced from renewable energy, in Queensland as well as a plan to export some to Japan. Total plant construction costs are estimated to be A$12.4 billion.

Since Kansai Electric Power Co., which was to be a recipient of the hydrogen, has already decided to withdraw from the project, it is possible the project itself will be halted.

The Australian government has been focusing on the promotion of the hydrogen industry, taking advantage of the country's solar potential.

There were signs that European firms are also growing hesitant to proceed with hydrogen projects. Finnish energy giant Neste Corp. and Spanish oil giant Repsol SA have already decided to freeze or withdraw their hydrogen business plans.

The International Energy Agency said that demand for clean hydrogen, which was up to 1 million tons in 2023, may expand to at least 6 million tons in 2030. According to the British research firm Wood Mackenzie Ltd., however, the global contracted volumes of hydrogen represent only 6 per cent of the total announced production capacity.

Hydrogen has potential uses in hard-to-abate sectors like steel production, as well as in transport.

Speaking at the Eurelectric EVision conference last month, however, Michael Liebreich, Chairman and CEO of Liebreich Associates and Co-Managing Partner of EcoPragma Capital, was scathing of the technology.

He said: "What is Europe prepared to do to get cheap energy, which is at the heart of prosperity and jobs… are we prepared to scrape off the barnacles? Are we prepared to admit that it [hydrogen] was a blind alley?

"Hydrogen Strategy 2021 proposed spending €460 billion just on production and distribution of hydrogen. The report said green hydrogen is going to cost €1.50, well it doesn't.

"It costs €6-13 and the experience curve is not going to help you, because it's 40 per cent electricity cost, 40 per cent heavy engineering and electrical engineering, and only 11 per cent electrolysers. We're not going to get cheap green hydrogen and we need to admit it."

# Biden-era clean energy support boosts renewable installations

- Trump's fossil fuel shift yet to take effect
- Support for renewables, as part of US 'energy abundance'

Janet Wood

Wind and solar overtook coal in electricity generation in the USA for the first time in 2024, according to an analysis by clean energy think-tank Ember. They contributed 17 per cent of the country's energy mix, while coal decreased its share to 15 per cent. Natural gas was 43 per cent of total generation, up 3.3 per cent on the previous year.

Federal Energy Regulatory Commission (FERC) data also recently revealed that solar and wind accounted for more than 98 per cent of new US electrical generating capacity in January. "The Biden-era closed out with record-setting solar additions and a rebound in new wind capacity," said Ken Bossong, SUN DAY Campaign's Executive Director.

Bossong said: "Whether solar, wind, and other renewables can continue that growth under the policies of the Trump Administration remains to be seen."

FERC's current three-year forecast expects gas capacity to expand, but by just 455 MW, while coal and oil generation will contract by 24 940 MW and 2237 MW, respectively. President Trump moved quickly to reverse several of his predecessor Joe Biden's green energy policies. A recent executive order suspends the sale of offshore wind leases and there is a freeze on permits for and construction of new wind projects on federal land and waters.

Energy Secretary Chris Wright also emphasized the Trump administration's focus on boosting domestic fossil fuel production, calling the previous administration's climate policies "irrational" and "quasi-religious." However, Wright acknowledged the growth potential of renewable energy sources.

At the same time, opposition to the Trump administration's energy policy has emerged recently.

Attorney General Kwame Raoul joined nine other state attorneys general to call on the US Senate Committee on Energy and Natural Resources to support a Senate resolution that would end a 'national energy emergency' declared by President Trump.

Raoul said: "There is no energy emergency because the United States already has an abundant, reliable energy system with production at an all-time high." The letter said that US energy production remains robust and that the country has been a net exporter of energy since 2019. They argue that extreme weather poses a more significant threat to America's energy grid than fossil fuel underproduction.

Meanwhile House Republicans from districts that received investment from clean energy tax credits, sanctioned by President Joe Biden in 2022, have begun a campaign to keep them. They argued recently that supporting renewable energy is in line with Trump's "energy dominance" agenda, despite the president criticising what he calls the "new green scam".

# Canada moves on offshore wind as it considers whether to halt US power exports

Canada's offshore wind industry may benefit from the uncertainty over plans in the US. In February, the Government of Canada joined the Global Offshore Wind Alliance (GOWA). The governments of two Canadian provinces, Newfoundland and Labrador and Nova Scotia, also became GOWA members.

Recently the Nova Scotia Department of Energy and Natural Resources Canada proposed five areas for the development of offshore wind farms and are seeking comment before making final decisions. The areas are French Bank, Middle Bank, Sable Island Bank, Sydney Bight and Western/Emerald Bank.

Nova Scotia wants to offer licences for 5 GW of offshore wind energy by 2030. The Canada-Nova Scotia Offshore Energy Regulator will manage a competitive licensing process for wind farms later this year.

The progress comes as Canada's cross-border trading of electricity with the USA came under scrutiny, with threats to impose tariffs. The North American Electric Reliability Corporation warned over energy stability if the two countries restricted cross-border electricity and gas supplies.

"If some of the sabre-rattling around 'turning off exports' occurs, it could create a significant resource adequacy problem for the Canadian provinces that benefit from US exports as well as the [US] states along the border that benefit from Canadian imports," said Jim Robb, NERC Chief Executive.

# Loan for Palisades keeps nuclear restart plan on track

The US Department of Energy recently announced it would make a second loan to Holtec to support restarting its decommissioned Palisades nuclear power plant. Palisades ceased operations in May 2022 after more than 40 years of operation. The $57 million loan is part of a $1.52 billion federal loan guarantee originating in the Biden administration, which remains in place because nuclear power is seen by the Trump administration as boosting US energy self-reliance.

"Unleashing American energy dominance will require leveraging all energy sources that are affordable, reliable and secure – including nuclear energy," US Energy Secretary Chris Wright said in a statement. "Today's action is yet another step toward advancing President Trump's commitment to increase domestic energy production, bolster our security and lower costs for the American people."

Recommissioning the 800 MW Palisades plant will still require US Nuclear Regulatory Commission licensing approvals, but Holtec officials are optimistic the plant could be restarted later this year. Holtec spokesman Nick Culp said: "This further underscores the important role that nuclear plays in America's energy future, not only in meeting our domestic energy needs but in bolstering our energy security and reaffirming our position as the global energy leader."

State Representative Pauline Wendzel said: "The long-awaited American nuclear renaissance is here."

# This decade should see South America add 120 GW of solar PV

- Brazil and Chile expansion despite changing landscape
- Constraints lead to co-location with battery storage

Janet Wood

South America will add 160 GW of solar PV to its generating capacity between 2025 and 2034, driven by diversification efforts, growing power demand, and favourable system economics, according to a new report by Wood Mackenzie. It said solar PV system economics will continue to improve, with a projected 42 per cent reduction in regional levelised cost of energy for single-axis trackers and fixed-tilt solar PV by 2035.

'South America Solar PV Market Outlook 2025' analyses the region's solar energy landscape, power sector dynamics, 10-year solar PV installation outlook and the likely effect of policy changes across key markets.

"South America's solar PV market is expected to slow down as mature markets stabilise, but growth is expected in emerging markets." said Felix Delgado, Senior Analyst, Americas Power & Renewables at Wood Mackenzie. "While there is growth in emerging markets, regional annual additions are expected to cool down as mature markets face lagging transmission infrastructure, increased curtailment, and rising transmission tariffs for small-scale solar."

In Brazil, the region's largest market, it said PV installations are now past their peak, which came in 2024. Both small-scale and utility-scale solar additions are slowing down in Brazil, after incentives that fuelled recent fast expansion started to expire. The country's solar industry also faces rising transmission tariffs, increased import taxes on solar modules, and distributor interconnection disputes. The report says capacity additions will continue to be driven by Power Purchase Agreements (PPAs) under the free-market environment and distributed generation installations.

Chile is facing similar challenges in curtailment and grid constraints, pushing the solar PV pipeline towards hybrid projects.

Nevertheless, the report said that as 'mature markets' Brazil and Chile will account for 78 per cent of total installations in the region in the next ten years.

Those countries are also first in line for co-located projects with solar and storage, because of the slow buildout of transmission capacity and the resulting higher curtailment. "The transition to solar-plus-storage projects in markets like Brazil and Chile is a critical development," Delgado said: "Chile is paving the way for storage adoption in the region and serves as a testing ground that highlights the challenges and solutions available for countries with already high penetration of renewable generation."

The report emphasizes the role of commercial and industrial off-takers in driving capacity growth. However, regulated auctions remain critical for emerging markets like Colombia and Peru.

Small-scale projects (less than 5 MW) will account for 48 per cent of the total regional buildout, as distributed generation schemes remain attractive across the continent.

# Peru opens up to wider generation types and hydrogen production

A new law in Peru to 'modernise' electricity generation will trigger investments of around $14 billion, according to Minister of Energy and Mines, Jorge Montero.

The recently approved law allows all technologies (including hydroelectric, thermal, solar, wind, biomass and geothermal) to compete in electricity supply tenders.

Regulations to implement the new law will be ready in the first half of this year, after which Montero said: "An explosion of renewable energies in Peru and of hydroelectric energy is coming, which will put us in extraordinary conditions for the future."

Montero also said: "We could also activate huge green hydrogen projects that strengthen the capacity to generate energy for Peruvians and, in turn, can be sold to neighbouring countries".

His comment came as Peru's Ministry of Production said it has approved an environmental impact assessment for a $11.2 billion green hydrogen project in the Arequipa region.

The Horizonte de Verano project, led by Verano Energy, will be a five-phase development involving construction of a 5850 MW solar farm. The initial phase will have 1500 MW of solar power, enough for an annual output of 420 000 t of ammonia.

"The approval of this project represents a milestone for the sustainable industrialisation of Peru, consolidating us as a key player in the production of green hydrogen, an essential resource for the global energy transition," said Minister of Production, Sergio Gonzalez Guerrero.

# India falling short on clean energy investment needs

Despite record solar installations last year, India is still falling well short on the investment needed to meet its clean energy targets.

Junior Isles

India's renewables sector must significantly increase investments and access foreign financing if it is to meet its target to more than double non-fossil fuel sources of generating capacity by the end of the decade, according to Ember.

A report by the energy think-tank said India received total green energy investment of just over $13 billion last year, well short of the $68 billion needed annually to achieve the government's goal of producing 500 GW of power from renewable sources by 2030.

Neshwin Rodrigues, Senior Energy Analyst for India for Ember and one of the report's authors commented: "When you look at the gap of how much money has to flow into renewables, it's very clear that, even in conservative targets, we need a lot more investments and financing than what is coming in."

The report estimated that a total capital flow of $300 billion by 2032 would be needed to keep India on track to meet its "ambitious" renewable energy targets. India has about 209 GW of installed renewable energy capacity, which contributes less than a quarter of the country's total power generation, according to Ember and government data.

In a separate report S&P Global's India subsidiary Crisil estimated that India's green investments totalled nearly $70 billion between 2019 and 2024. This will need to go up to $350 billion in the next five years if it is to meet its green energy targets, Crisil forecast. It said this would be an "uphill task" because of perceptions of low-carbon projects being high-risk, facing longer gestation periods and changing regulatory policies that result in an unpredictable business environment.

India, which is the world's third-largest emitter of greenhouse gases, has set ambitious clean energy targets to meet its climate change commitment of achieving net zero carbon emissions by 2070.

According to a recent report by the Council on Energy, Environment, and Water (CEEW), India must scale up its non-fossil-fuel power capacity to 600 GW by 2030 to meet rising electricity demand reliably and affordably.

The report, 'How Can India Meet Its Rising Power Demand? Pathways to 2030', highlights the need for a high-renewable energy pathway if energy demand continues to exceed current projections due to climate change or rapid economic growth.

It proposes an energy mix that includes solar power (377 GW), wind energy (148 GW), hydropower (62 GW), and nuclear (20 GW). To support this transition, India must also invest in flexible energy resources to ensure grid stability, said CEEW. The key components include: battery storage (70 GW of four-hour battery energy storage systems); pumped storage hydro (13 GW) and retrofitted coal plants (upgrading 140 GW of coal capacity for grid management).

The need for rapid acceleration of new clean capacity saw record solar additions last year. According to Mercom India the country added 25.2 GW of solar in 2024, up more than 204 per cent year-on-year. Solar installations made up 73 per cent of new power capacity in 2024.

"India's solar sector saw record-breaking installations in 2024, but the numbers could have been significantly higher if not for transmission issues and supply chain delays. Rising costs due to import duties and expensive domestic modules remain a concern for the industry. With over 35 GW of annual solar additions needed to meet 2030 goals, the industry requires clear, stable policies that balance local manufacturing with seamless project development," commented Raj Prabhu, CEO of Mercom Capital Group.

Meanwhile, India's annual wind power capacity addition is expected to more than double to 7.1 GW on average over the next two financial years, compared to 3.4 GW during the 2023-2025 period. This growth is driven by government measures to accelerate project development, according to a report by Crisil Ratings. The projected increase will take the country's total installed wind capacity to 63 GW by FY27.

Last month its climate target goals received a boost when the government also proposed to build 18 more nuclear power reactors with a cumulative generating capacity of 13 800 MW. Five sites have already been given in-principle approval.

## Philippines sets out terms of fourth round of clean energy auctions

The Philippines Department of Energy (DOE) has released the terms of reference (TOR) for the fourth round of the Green Energy Auction (GEA-4), aimed at adding 9378 MW of new capacity from ground-mounted solar, roof-mounted solar, floating solar, and onshore wind projects.

The auction also includes renewables plus storage systems, specifically solar plus battery energy storage systems. With an additional 1100 MW of solar capacity integrated with energy storage, these projects are expected to enhance grid reliability and flexibility.

The announcement of the TOR follows DOE approval of system impact studies (SIS) for 11 energy projects across the country, paving the way for their assessment and potential integration into the power grid.

The projects, primarily renewable energy (RE) initiatives, will undergo evaluations to determine the grid's capacity for new connections and identify necessary upgrades in transmission lines, transformers, and substations.

The approved projects include three pumped-storage hydropower facilities, one hydropower plant, five wind farms, one battery energy storage system (BESS), and one coal power plant, all of which have been endorsed to the National Grid Corporation of the Philippines (NGCP) for assessment in early 2025.

The Maton pumped-storage hydroelectric power project in Apayao leads the list with a 2000 MW capacity, making it the largest among the approved facilities.

■ Acciona Energía has broken ground on the Daanbantayan solar plant (176 MWp) on Cebu island.

## Vietnam creates offshore wind opportunities

Vietnam's government decree to providing regulations for the development of large-scale offshore wind power projects, will open up investment opportunities and provide greater clarity for the market, according to experts.

Decree No. 58/2025 will provide incentives for offshore wind projects approved by authorities before January 2031. This includes exemption from maritime area use fees for the first three years of construction followed by a 50 per cent reduction for the next 12 years, and a commitment from the Vietnamese government to purchase at least 80 per cent of eligible offshore wind projects' output for 15 years, unless buyers and sellers have other agreements in place.

Vietnam currently has no offshore wind power projects and is aiming to add 6000 MW of the renewable energy source by 2030 with the ultimate aim of achieving over 113 500 MW of wind power by 2050.

Offshore wind projects are required to have at least a 5 per cent stake owned by a state-owned enterprise.

Vietnam's energy mix is still dominated by coal, gas and large hydro projects, however, in recent years there has been increased investment in renewables due to attractive feed-in tariffs.

However, last month saw 28 developers sign a letter pushing back on a change in the pricing framework for solar and wind projects in Vietnam, arguing it may impact $13 billion worth of investment in renewables.

In a letter seen by *Reuters* and dated March 5, investors told Vietnamese leaders they were "deeply alarmed" by the potential end to favourable energy tariffs.

They warned that the policy change could weaken broader financial stability and damage trust in Vietnam as it seeks to significantly increase its renewable energy capacity in a drive to meet an emissions reduction target of 43.5 per cent by 2030 and net zero emissions by 2050.

# State Aid clearance awarded for green hydrogen projects

- Lithuania and Austria access European Hydrogen Bank
- Seven projects funded in Spain

Janet Wood

The European Commission has approved two State Aid schemes that will support a ramp-up of renewable hydrogen production in Austria and Lithuania. The schemes have combined funding of €436 million.

Teresa Ribera, Executive Vice-President for Clean, Just and Competitive Transition, said: "These schemes mark an important step in boosting renewable hydrogen development and reducing the cost of this strategic clean fuel. They will support the most competitive projects in Austria and Lithuania, reducing the burden on taxpayers and minimising possible market distortions."

Through the European Hydrogen Bank's 'Auctions-as-a-Service' tool, these projects will help achieve the EU's target of producing 20 million tonnes of renewable hydrogen by 2030.

Longer term the aim is to reduce Europe's dependence on Russian fossil fuels and boost the EU's industrial competitiveness in the global hydrogen economy.

The European Hydrogen Bank is an EU-led initiative designed to bridge the investment gap in renewable hydrogen production while connecting suppliers to potential consumers across the continent. It supports both domestic hydrogen production and imports and is funded from the EU Emissions Trading System (ETS) revenues.

By implementing a structured hydrogen auction system, the European Hydrogen Bank seeks to incentivise cost-competitive hydrogen production, thereby driving scalability and market adoption.

Austria's €400 million scheme aims to produce 112 000 tonnes of renewable hydrogen, while Lithuania's €36 million scheme will support the production of 13 000 tonnes of renewable hydrogen.

The financial aid under these schemes will be distributed through a competitive bidding process, set to conclude in the first quarter of 2025. The grants will be awarded per kilogramme of renewable hydrogen produced, and for a maximum of ten years.

Meanwhile the Spanish government has provisionally allocated funds totalling €1.21 billion to seven renewable hydrogen projects, creating a cluster that will provide 2278 MW of electrolysis capacity.

The facilities across Aragon, Andalusia, Castile and Leon, Catalonia and Galicia will mobilise €5 billion in investment. Each of the provisionally selected projects has a production capacity of at least 100 MW and guaranteed purchase commitments of at least 60 per cent of the expected output by industrial consumers.

The autonomous community of Aragon is set to receive the largest amount, with €384 million for two projects, one of which is a shared scheme with Catalonia.

Under its updated National Energy and Climate Plan, Spain aims to have an electrolysis capacity of 12 GW by 2030 and increase the use of renewable hydrogen in the decarbonisation of hard-to-abate sectors.

## Romania could house Europe's largest onshore wind farm

Romania could be the site of Europe's largest onshore wind farm if a new project from Danish developer Eurowind is approved.

Eurowind recently submitted an application to Romania's Transelectrica for a permit to a 1200 MW wind farm to be built in Botosani County.

The project is at an early stage investor and it is likely that the total project, which would be completed in stages, will not be operational before 2031. In practice it will comprise nine wind farms located in nine communes in northern Botosani county.

Local reports say that EWE Eolian has submitted a connection application to Transelectrica and the land has been secured by the Danish investor.

Some of the power generated by the wind farm is expected to be exported to the Republic of Moldova, through the new Suceava-Balti power line which is currently being constructed.

Local reports say that although the region has less favourable wind conditions than some other areas of Romania, it has the benefit of being relatively uncongested. In contrast, the southeastern area of Romania faces congestion.

Currently Europe's largest wind farm is Fosen Vind in Norway. Completed in 2020, the wind farm has a generating capacity of 1057 MW and is owned by Statkraft.

## Spain 'needs nuclear' say operators, but storage is the priority

Iberdrola's Executive Chair has warned electricity prices could jump by more than 25 per cent if Spain repeats the "big mistake" made by Germany of shutting down its nuclear power plants.

Ignacio Galán told the *Financial Times* recently that consumers would pay higher prices and get a less reliable system if Spain proceeded with plans to phase out all seven operating nuclear reactors in the country by 2035.

"Can we as Europeans be in a position to renounce those natural energy resources, just because of ideology? Or do we have to be pragmatic, like the Americans?" Galán said in a recent interview.

Spain's plan is in contrast to countries, including the US, Japan and Belgium, who are extending the lifespan of their nuclear fleets. Spain's nuclear owners agreed a closure plan in 2019 with the then Socialist-led government, but recently have called for a rethink

Spain closed 2024 with renewable generation representing 56.8 per cent of all electricity produced, including a boost in hydro, which was up 35.5 per cent on 2023.

However, Spain is lagging on storage, with just 3.4 GW, almost all pumped storage. The Spanish government wants that to reach 22.5 GW by 2030.

## UK acts to speed up expansion of transmission network

- Regulator gives go-ahead for early investment
- Planning and connections process streamlined

Janet Wood

UK energy regulator Ofgem has announced plans to fast-track around £4 billion of investment in new electricity transmission as part of a £75 billion effort to decarbonise the grid by 2030. It is the latest move by officials to free up the UK's planning system and accelerate progress toward a low-carbon electricity system by 2030.

Nicola Connelly, Chief Executive of SP Energy Networks, said: "The £75 billion proposed investment in the transmission system is the foundation of the government's growth ambitions, unlocking grid capacity for homes and businesses, moving homegrown clean energy around the country and reducing constraint costs for consumers. That's why the speedy delivery of this national infrastructure upgrade is critical.

"Securing our supply chains early for cables and other equipment is vital if we're to re-wire Britain at record pace. This is good news for growth, good news for jobs and good news for electricity consumers."

Also the government and regulator said they would allow renewable energy projects to "move to the front of the queue" for grid connections, sidestepping current waits of up to 10 years. Ministers said the "first come, first served" process for joining the electricity grid would be replaced by a more efficient "first ready, first connected" system, under which preferred projects will be fast-tracked if they are closer to completion.

Finally a new Planning and Infrastructure Bill has been published that is designed to accelerate planning decisions to get major network projects built faster.

The legislation will formalise compensation for people living near new electricity infrastructure.

Meanwhile the first investment for the UK's new state-owned energy company, Great British Energy, will be £110 million ($142 million) in grants to fund solar panels and other clean energy production at schools, hospitals and community projects, with no return for the company.

The backing will be matched by other UK government funding, amounting to total taxpayer investment of about £200 million for the projects.

Setting up GB Energy was part of Labour's pitch to voters in last year's general election to help cut Britain's reliance on fossil fuels and reduce electricity bills.

GB Energy's founding statement added it would provide a "route" to building clean energy assets which would "generate profit that is returned to invest in new projects and for the wider benefit of UK taxpayers, bill payers and communities".

However, it has been slow to define exactly what role it will play. Dan McGrail, the interim Chief Executive, said last month it was looking at investing in floating offshore wind, currently riskier and more expensive than fixed-bottom technology.

## Dutch network adds thousands of kilometres to accommodate wind

Dutch network company TenneT spent more than €10 billion in 2024 in upgrading its high voltage networks, and its further upgrades to 2026 will be supported by two shareholder loan facilities from the Dutch state totalling €44 billion. TenneT's investment in 2024 was 38 per cent greater than the previous year, and included onshore and offshore grid expansion. TenneT's investment will add 4800 km of overhead connections and almost 3800 km of underground power to increase its wind farm connection capacity from 12.2 GW now to 42.4 GW in 2031.

Offshore, it is connecting 14 large-scale offshore wind projects. Onshore, projects include Germany's SuedLink and SuedOstLink, and the commissioning of Wahle-Mecklar – Germany's longest AC project.

Manon van Beek, CEO of TenneT Holding, said: "Our investment portfolio is about building a reliable and cost-effective electricity grid that supports the transition to an electricity system delivering on energy security and energy independence."

Meanwhile Dutch distribution network operator Stedin has signed a €500 million loan agreement with the European Investment Bank (EIB) to upgrade its network in 2025-2026. EIB Vice-President Robert de Groot said: "The EIB invests heavily in the energy transition, ranging from wind farms to distribution networks and interconnectors. We support innovation throughout the private and public sector in Europe."

# O&G companies will continue to shift away from fossils

- European companies continue to move forward with renewable energy plans
- TotalEnergies expected to be fourth-largest wind energy producer by 2030

Nadia Weekes

Renewable energy will play a growing role in the product portfolios of oil and gas companies, as it is forecast to represent more than 40 per cent of the global energy mix by 2030, according to analytics company GlobalData.

Global power generation has been shifting towards wind and solar power, with renewables doubling over the past decade while global energy generation rose by around 30 per cent.

GlobalData's strategic intelligence report, 'Renewable Energy in Oil & Gas', evaluates the role of oil and gas players in the renewable energy sector. It also benchmarks the efforts of oil majors such as TotalEnergies, BP, Shell, Petrobras, Equinor, Eni and Repsol in the renewable energy value chain.

Ravindra Puranik, oil and gas analyst at GlobalData, said that these companies, despite being relatively new entrants in the sector, were "making notable movements in the competitive landscape for renewable energy, particularly in offshore wind".

Although oil and gas majors have slowed down the pace of investments flowing into renewable energy over the past year, European companies have continued to move forward with their renewable energy plans. GlobalData expects TotalEnergies to be the fourth-largest producer of wind energy globally towards the end of this decade, if all its proposed projects go online.

This contrasts with the prospects for "the clear laggards in the renewable energy segment", US-based oil majors ExxonMobil and Chevron. "These two companies have negligible capacity footprint in this theme and have no plans to alter this scenario in the near future," Puranik said.

With the rising electrification in emerging markets and the increasing energy demand from data centres and other expanding digital technologies, as well as the growing adoption of electric vehicles, demand for power will continue to grow.

"Considering all this, it is logical for energy companies to shift towards alternate, emission-friendly sources, such as solar and wind power. Early adopters of renewable energy may secure long-term sustainability in the evolving energy landscape," Puranik added.

Meanwhile, Copenhagen Infrastructure Partners (CIP) has announced that its fifth flagship fund, CI V, has raised over €12 billion ($13.1 billion), significantly exceeding its original fundraising goals.

CI V will invest primarily in large-scale renewable energy projects. Jakob Baruël Poulsen, CIP Managing Partner, said there was robust global demand "pushing the energy transition forward".

Poulsen added that the fundamentals for renewables "are as strong as ever as industrial competitiveness, productivity and energy resilience are at the centre of political and industrial agendas globally".

# Record wave of lease auctions underpins offshore wind rebound

The global offshore wind industry is set for a rebound in 2025, with capacity additions expected to reach 19 GW and sector-wide expenditure projected to hit $80 billion, according to research from Norway-headquartered Rystad Energy.

A wave of lease auctions is driving the resurgence. In 2024, a record 55 GW of offshore wind capacity was offered in lease auctions globally (excluding China). However, according to the research, not all of this capacity has yet been awarded.

Although 2025 is expected to be a good year for offshore wind, certain signals including US federal policy could affect its upward trajectory. "President Donald Trump's January memorandum halting new leasing and approvals on the Outer Continental Shelf (OCS), citing environmental and safety concerns, could last throughout his term, pausing new developments and creating continued uncertainty for ongoing projects," said Petra Manuel, senior offshore wind analyst at Rystad Energy.

Uncertainty in the US offshore wind market, however, has opened up a unique opportunity for Europe and APAC to accelerate offshore wind volume growth together, according to Danish wind energy consultancy Ramboll.

"Trump's election has undoubtedly reduced the confidence in parts of the offshore wind industry for some time – but we need to recognise how shifting momentum can help us turn adversity into opportunity," said Tim Fischer, Director for Ramboll's Global Wind Division.

"Developers, investors and OEMs are already turning their attention back to home markets – offering a chance for Europe and APAC to work together on accelerating offshore wind growth. Improved collaboration between the two regions is critical to driving the necessary increases in volume needed to make a success of global offshore wind," Fischer added.

Ramboll recommends that Europe and APAC focus their efforts on the following areas: enhancing supply chains and vessel fleets; joint investments and market expansion; knowledge and technology sharing; and accelerating floating offshore wind.

# Egypt to develop large-scale battery storage projects

Dubai-headquartered AMEA Power has signed Capacity Purchase Agreements with the Egyptian government to develop the first standalone battery energy storage systems (BESS) in Egypt with a combined capacity of 1.5 GWh.

The two projects – a 500 MWh BESS in Zafarana and a 1000 MWh BESS in Benban – will enhance grid stability and enable greater integration of renewable energy sources in the country's national energy mix.

AMEA Power has a significant presence in Egypt's renewable energy sector, with investments exceeding $3 billion across solar, wind and battery storage.

Meanwhile, Saudi Arabia's ACWA Power has signed a 25-year power purchase agreement (PPA) with the Egyptian Electricity Transmission Company (EETC) for a 2 GW wind project.

The project, with an investment of approximately $2.3 billion, will become Egypt's largest wind farm, surpassing ACWA Power's under-development 1.1 GW Suez wind farm, which reached financial close last December. The new project is targeted for financial close in 2026.

ACWA Power has been active in Egypt since 2015 and operates two solar PV assets in the country: a 120 MW project in Benban and a 200 MW facility in Kom Ombo.

ACWA Power has so far committed $8.8 billion for renewable energy projects in Egypt, with a gross capacity of 4.8 GW. Egypt has a goal of renewable energy representing a 42 per cent share of power generation by 2030.

# Morocco approves $32.7 billion green hydrogen projects

The government of Morocco has approved six green hydrogen projects for the production of ammonia, industrial fuel and green steel that are worth $32.7 billion, and selected five groups of national and international investors to carry them out across the country's three southern regions.

The selected groups include:

- Ornx, consisting of Ortus, Acciona and Nordex, which will invest in the production of ammonia;
- TAQA and Cepsa, which will produce ammonia and synthetic fuel;
- Morocco-based company Nareva will produce ammonia, synthetic fuel and green steel;
- Saudi Arabian company ACWA Power, which will invest in the production of green steel;
- Chinese companies UEG and China Three Gorges will also produce ammonia.

Morocco has a vast renewable energy potential, ample land and is close to demand centres in Europe, making it an ideal destination for green hydrogen production.

Each project is said to have been offered up to 30 000 hectares of land in the regions of Laâyoune-SakiaEl Hamra, Dakhla-Oued Eddahab and Guelmim-Oued Noun.

The six projects are in addition to the two agreed by Morocco's King Mohammed VI and French President Emmanuel Macron in October 2024. They involved French companies Total Energies and Engie and included the development of five projects, one of which was aimed at the green hydrogen sector.

# Uzbekistan to implement new energy-saving measures in 2025

Uzbekistan is preparing to roll out a series of energy-saving initiatives to counteract a steep rise in the country's demand.

The government's plans to improve efficiency emerged from a meeting held by President Shavkat Mirziyoyev to review the proposed measures.

The first priority is to modernise outdated infrastructure. The replacement of old water management pumps alone could save 1 TWh of electricity annually. In addition, upgrading heating systems in social institutions and integrating renewable energy sources is expected to save 5 million cubic metres of gas and 15 million kWh of electricity this year alone.

The strategy aims to conserve 1.6 bcm of natural gas and 3.5 TWh of electricity in 2025. Companies will receive specific, science-based recommendations on energy optimisation, while large industrial firms will be subject to new energy consumption standards, potentially reducing energy costs by 5-10 per cent.

Additional measures include expanding thermal insulation programmes for residential buildings, providing low-interest loans for solar panel installations, and launching a nationwide energy conservation education programme inspired by practices that are commonplace in Japan.

Currently, Uzbekistan's energy consumption per unit of GDP is 2.5 times the global average. Electricity losses in the distribution network stand at 14 per cent, while natural gas losses exceed 7 per cent.

Government officials have identified excess use in seven regions that could save 4.6 TWh of electricity and 1 bcm of natural gas.

# Electrification finds a sweet spot at Moerdijk

Electrification of industrial processes is seen as an important tool in the global decarbonisation effort. **Junior Isles** hears how Siemens Energy is helping Shell to cut carbon emissions by replacing old steam-driven compressors with electric drives at the Moerdijk Chemicals Park in the Netherlands.

***Photo: courtesy Shell Chemicals Park Moerdijk***

Shell Chemicals Park Moerdijk plays an important role in Shell's global chemical activities. Located in North Brabant, Netherlands, the complex has been producing chemicals since the 1970s. But like many other industrial facilities, Shell has been striving to meet government targets for reducing carbon dioxide ($CO_2$) emissions.

The most recent sustainability driven project has seen Shell Chemicals Park Moerdijk embark on a project that will deliver significant savings in carbon emissions. In short, the project will see the electrification of the steam cracker process for producing ethylene which is used as a feedstock for the production of industrial chemicals, a range of materials such as plastics and food ripening process.

The project will see Siemens Energy replace existing steam turbines driving compressors in the steam cracker plant with electric drives in a move that is expected to reduce Shell's $CO_2$ emissions in Moerdijk by 230 kilotons per year. At this scale, it could become an industry showcase project.

Electrification has been on Shell's agenda for some time. It began at the Moerdijk facility in 2018 with the replacement of steam turbines with electric motors at a non-critical services part of the plant. The energy transition journey continued with a large solar panel park and replacement of more efficient cracking furnaces with project Skyline. The latest project, however, will see the electrification of the core part of the chemical complex.

Peter Postma, Sales Manager, Energy Solutions, at Siemens Energy, has long been involved with the Moerdijk electrification project and was responsible for securing the contract with Shell. He said: "The heart of the Shell Moerdijk plant is the production of base chemicals in the cracker with ethylene and propylene as key products. The compression system is at the heart of this production process. And if it does not run, the whole plant stops, resulting in flaring and production loss. So, the system must be robust. Steam turbines have therefore been used since the 1970s to drive mechanical compressors. These steam turbines are driven by steam from simple gas fired boilers. It's a simple system that is still running today; it is old but reliable."

Using this simple but robust set-up for compression made perfect sense. In the 1970s there was no legislative pressure to reduce $CO_2$ emissions, and gas prices were low. Today, the scenario is very different. Organisations and governments are under pressure to become carbon neutral within the space of just a few decades. At the same time gas is now very expensive.

Extremely high and volatile gas prices across Europe over the last three years have certainly served as a catalyst in the drive for electrification throughout industries. Countries and businesses have already been shifting towards wind and solar in the EU, not only to combat climate change but also to safeguard themselves in a precarious gas market.

Postma noted: "The difference in price between electricity and gas has now become more in favour of electricity. On top of that, there are decarbonisation goals. These are for many of our customers, the two main drivers to change from steam to electricity [for compression]. $CO_2$ reduction is of course important but the cost reduction in industrial processes justifies projects like this even more."

There will be other benefits from the project too. In addition to cutting $CO_2$, electrification of the compression process also reduces energy consumption by approximateky 75 per cent and notably nitrous oxides (NOx) by 30 per cent.

Albert Zuyderduyn, Siemens Energy's Project Manager for the Moerdijk project, said: "NOx is arguably even more important than $CO_2$. And there will also be a significant reduction in the particulates emissions that you have with gas, as well as improvements to further reduce the heat loss so less cooling water will be needed. After this retrofit, it will become one of the most efficient liquid crackers in Europe in terms of energy efficiency."

The project will be challenging. The Moerdijk chemical complex consists of multiple gas fired boilers that generate steam for the facility; among them are two steam turbine-compressor trains. The first train consists of a 25 MW steam turbine driving a compressor, and a second train with an 8 MW steam turbine and compressor.

"Basically, it's two electrifications in one project," said Zuyderduyn. "So, we are replacing two steam turbines with two electric motors. The steam turbines are still running well. They had some overhauls but now is a good time to take them out."

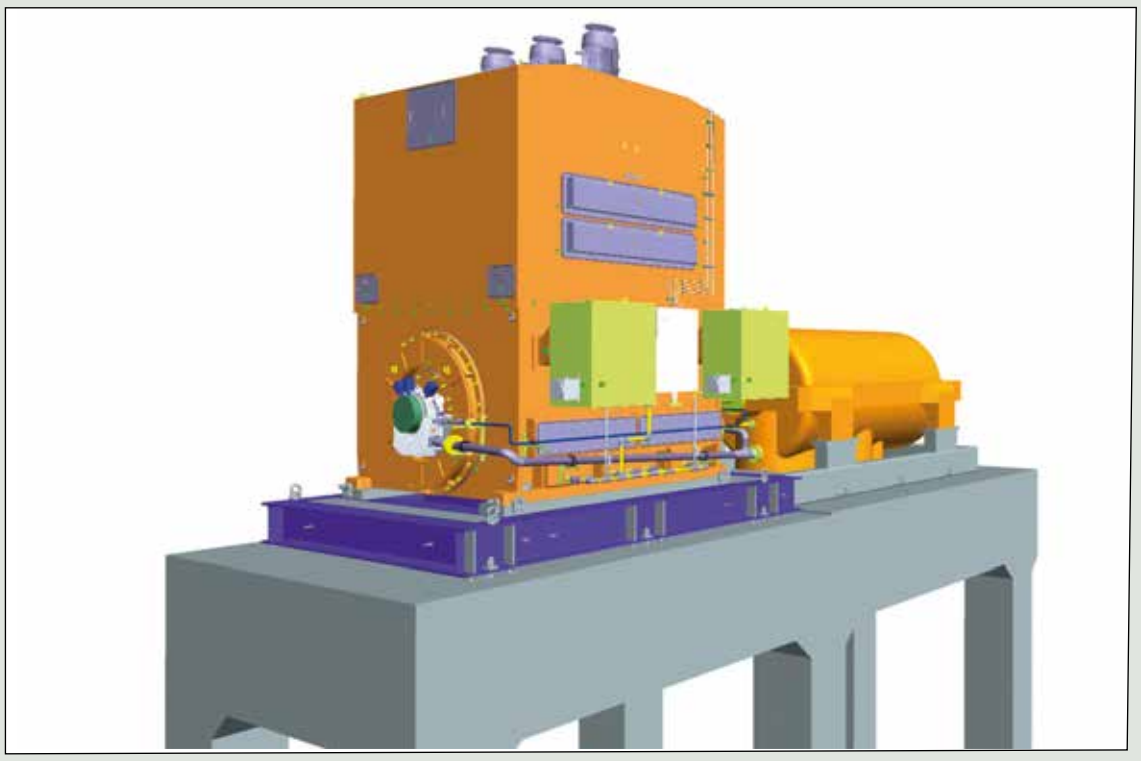
Postma added: "The steam turbines have been running continuously without any stops. And replacing them is a challenge. If you move to electrically-driven motors, you have to ensure that they can run 24/7 for 365 days/year for decades, at least until the next turnaround, without failure.

Siemens Energy, together with Shell, carried out a reliability, availability and maintenance (RAM) study during the tender phase and are continuing this study during execution to identify any weak spots.

"This helps us select the right materials, set up the necessary redundancies or implement mitigation measures so that the system can be quickly recovered if it fails," said Postma. "You only have a moment during the six to seven years turn around to check if everything is fine."

Special attention was paid to the variable frequency drives and the

**E-House with variable frequency drive, cooling system and auxiliary systems**



**High speed electric motor with intermediate base frame connected to the existing compressor**

cooling systems. The drives are therefore equipped with totally redundant cooling systems. All the control systems that control the cooling systems and drives are also configured to be fault tolerant.

The RAM studies also demonstrate how the solution will be implemented. "Now the project still has to be delivered… the proof is in the pudding," said Postma.

Mitar Tomic, who is working as Solutions Architect at Siemens Energy's Centre of Competence for E-Drives, has been involved since the bidding stage, specifying the solutions and technical scope of the offer.

He said: "We studied their situation and made sure that the solution is reliable. We did a lot of work in selecting equipment and assessing the various solutions to translate that into availability figures; and then demonstrate that it will work."

Tomic added: "Unlike other industries, such as steel or mining, where you have the opportunity to stop the process every month or six months, petrochemicals plants must run continuously because any unplanned shutdown results in production losses and therefore financial losses. So, the key requirements for the electric drive system are reliability and availability.

"The second important criterion for the complete drive system is maintainability. If there is a failure, it must be returned to service very quickly, within hours. High system efficiency and pro-active monitoring is also very important."

As this is a brownfield project, it was paramount that Siemens Energy paid close attention to space optimisation.

"The solution must be suitable for the existing space and foundation. Usually, the steam turbine has smaller space requirements than an electrical drive. So, you need to use a specially designed high-speed motor to avoid the need for a gearbox. We therefore selected products that both we and Shell are familiar with," said Tomic. "It hits the sweet spot in terms of reliability and sizing." He added: "Space also has to be optimised for other areas such as the substation and transformer."

Siemens Energy is well positioned to meet the numerous requirements of the project. It is one of the largest suppliers of rotating electric equipment itself, and not only has advanced tools for equipment design but also for checking complete system integrity, according to Tomic.

"As a leading company in the field of electrical engineering and integrated projects in the power industry as well as oil and gas, we can provide complete solutions from high voltage down to the motor. Siemens Energy is one of the leading system integrators for control and automation systems for these drives," he said. "Further, we have a huge database [with data and experience] from similar projects as well as from compressors and electrical drives themselves, so we are able to avoid potential weak points."

While this was one key factor in winning the contract, Siemens Energy also had to convince Shell that it could execute it "flawlessly".

Postma explained: "During a turnaround, when the plant is fully down the turbine-motor swap will be done with lots of preparation in advance. It will be like open-heart surgery where you have to do everything in time. So, when the plant is shut down, together with our partners, we must remove the existing equipment and replace it with the new equipment during this period. So, it all must be perfectly planned before we execute. This means you have to put a lot of effort into investigating and engineering so that everything is done correctly."

To ensure it is all completed in this turnaround window, a number of activities will be carried out in advance.

Initially it was planned that both compression trains would be replaced at the same time, but it was then decided that the smaller train will be replaced first.

"As the smaller train is less critical it is possible to continue production, but just at a lower rate," said Postma. "If you switch off the smaller compressor, you will just turn down the total production volume. This means the smaller train can be done without stopping the entire process. So, it's like a pre-turnaround activity. And the advantage of this is that we can learn lessons to improve the second, most important one that needs to be done in the turnaround period. We have experience with this, but every project has its own characteristics."

"Everything we can do pre-turnaround, such as installation of certain equipment, we will do pre-turnaround," added Zuyderduyn. "The turnaround then includes decommissioning the old steam turbine, removing it, installing the electrical motor and connecting it to the compressor."

The trickiest part will be the first startup. "You have to make sure everything is right", says Zuyderduyn. Everything has to be double-checked and thought through in advance.

Siemens Energy is currently finalising the engineering. Zuyderduyn commented: "We are focusing on the production [of the equipment]. Then for the middle of this year we will start first installations on site. And then early 2026 is the big turnaround."

This called for equipment to be ordered at an early stage, so that all equipment is scheduled for delivery this year. "It is our key focus that these deliveries do not slip," said Zuyderduyn.

Although there will be several milestones along the way, the key dates are those for the turnaround – early 2026 for the smaller 8 MW compressor train, and a few months later for the main 25 MW train.

On completion, the Moerdijk project will provide a number of additional benefits to Shell, in addition to environmental and cost reduction.

Firstly, greater digitalisation will be possible since all systems will be electronic. "There is a goal to have data analytics across the entire system, so we can analyse the availability," said Postma. "With mechanical drives, that's not possible."

"We are working on solutions to predict and see degradation of electronics and then turn that into a prediction of availability or the right moment to replace it," said Postma. He also noted that greater digitalisation reduces costs.

As decarbonisation efforts continue, Siemens Energy expects to see more electrification projects within the petrochemicals and oil and gas sectors, especially in Europe. "Gas molecules will be replaced with green electrons from renewables. And the faster you can do this, the sooner you will have sustainable productions," said Postma. "There are several processes that can't be electrified, and there you will use hydrogen. But today, this [electrification] is the sweet spot for $CO_2$ reduction."

Accordingly, Siemens Energy is gearing up for the surge in electrification. "You see this in our competence centre, with new people joining every month," said Zuyderduyn.

Looking to the future, Postma summed up: "There is a market here. Customers are switching from gas to electricity, which means they need solutions like this. It's a huge investment for Shell but the payback time is only a few years. Sustainable solutions cost money, but they pay-off in the long run. This is a profitable, sustainable solution."

**Shell Chemicals Park Moerdijk, located in North Brabant, Netherlands, has been producing chemicals since the 1970s. Photo: courtesy Shell Chemicals Park Moerdijk**

# Siemens Energy and Rolls-Royce team up on SMRs

Junior Isles

Siemens Energy and Rolls-Royce SMR have entered into a partnership agreement that is expected to lead to the exclusive supply of conventional technology for future small modular reactors (SMR).

Under this agreement, Siemens Energy is to be the sole supplier of steam turbines, generators, and other auxiliary systems for the British manufacturer's planned Generation 3+ modular nuclear power plants. The final contract, detailing all specifics, is expected to be completed by the end of 2025.

SMRs are seen as a promising technology for the future of nuclear energy and a key factor in the success of the energy transition. They are more compact, safer, and more cost-efficient than conventional nuclear power plants. Rolls-Royce SMR is currently developing a "mini nuclear power plant" that can be operational much faster than traditionally built plants, thanks to its standardised, modular design. Rolls-Royce SMR's pressurised water reactors are designed to achieve an electrical output of up to 470 MW.

Commenting on the agreement, Karim Amin, a Member of the Siemens Energy Executive Board, said: "We are currently experiencing a global renaissance of nuclear energy. Numerous countries are turning to nuclear technology to produce low-emission electricity, and small modular reactors will play a key role in this. Siemens Energy brings decades of experience in conventional equipment, while Rolls-Royce has the necessary implementation expertise."

The tie-up followed a warning in late February from the head of Rolls-Royce that the UK government runs the risk that critical supply chains to support the development of small nuclear reactors will be built elsewhere if it fails to select the companies to build them by the end of June.

Rolls-Royce was one of four companies shortlisted last year by the government to develop SMRs. The competition has been subject to delays, although Great British Energy, the government's state-owned energy company, said it expected to select two winners by the "spring".

SMRs are also being touted as ideal energy sources for the rapidly growing data centre market.

Meanwhile, at the end of February, Rolls-Royce Power Systems achieved record sales, profit and return on sales in the financial year 2024, largely driven by the sale of mtu solutions for emergency power supply for data centres and governmental business.

Dr Joerg Stratmann, CEO Rolls-Royce Power Systems, said: "These record figures are the result of our clear strategy focusing on energy supply, governmental business, marine, battery storage and service.

"We are in a strong position in our markets around the world. We have increased our market share in mtu products and see further growth potential. Some of our end markets are growing significantly, decoupled from the general economic trend. This and our order intake of €6 billion make us very confident for 2025."

# Global businesses push forward on energy transition with refined investment criteria

Businesses are increasingly factoring cost-competitiveness and overall investor returns into their decision-making as they push forward with their energy transition investments, according to new research by global law firm Ashurst. As businesses continuously update strategies at what is a pivotal juncture of the global transition movement, businesses must evaluate a broader range of factors to support energy transition investments.

The report, 'Powering Change: A New Era for the Energy Transition', captures the views of nearly 2000 business leaders from across the G20 economies. This year's report also analyses trended data from the past five years of its energy transition research, revealing how attitudes towards the global transition to cleaner energy have evolved since 2019.

Although corporates remain committed to driving change, they are taking a more considered approach to energy transition investments. The vast majority (87 per cent) of respondents said their investment strategy has changed in response to the energy transition over the last 12 months. The shifting attitudes can be explained by business leaders refining investment criteria, while also balancing parallel challenges, such as geopolitical tensions and energy security.

Investment sentiment for renewables remains strong. This year, over three quarters (77 per cent) of respondents viewed renewable energy investment as essential to their strategic growth, with solar remaining the most popular renewable energy source to invest in over the five-year period, rising from 52 per cent in 2019 to 59 per cent today. The overall success of solar can be seen as an example of how government support can help growth and lead to a reduction in real costs of technology.

In this context, the responses suggested that many businesses are eyeing 'power-to-X' (P2X) technologies as one potential route to realising at least part of their transition plan ambitions. Corporates have real confidence: 80 per cent of respondents plan to increase investment in P2X over the next five years. However, key challenges identified by respondents included cost of technology (56 per cent), integration with renewable energy sources (49 per cent) and transportation and storage (48 per cent). As businesses assess the viability of projects, regulatory certainty, a more developed subsidy regime and significant investment will be essential for realising the potential of P2X technologies.

Michael Burns, Global Co-Head of Energy at Ashurst, said: "Businesses remain committed to clean energy, but as they respond and adapt to ever-evolving market conditions, they are continuing to strategically assess what their energy transition journey looks like. Inevitably, in some cases this may mean becoming more selective about clean energy investments. Navigating this next – and crucial – stage of the global energy transition will require a careful balance of aspiration with economic alignment."

Dan Brown, Global Co-Head of Energy at Ashurst, added: "At this critical point in the global energy transition, businesses are now examining the bigger picture once more, in order to take a larger leap forward. This approach will allow businesses to position themselves more confidently in the long-term. Increased scrutiny will be crucial for more clarity on investment plans, particularly in order to overcome the various obstacles which are currently slowing the implementation of the journey."



# Uncertainty over political support for clean transition sees green energy stocks tumble

Clean energy stocks have sunk to levels last seen five years ago, as uncertainty over political support for the clean energy transition away from fossil fuels puts a brake on the market.

Following an environmental, social and governance flurry that pushed green energy stocks to record highs, the S&P Global Clean Energy Transition Index, which tracks the performance of big clean energy companies, has dropped 16 per cent over the past 12 months.

Some investors believed shares would start to recover late last year as interest rates levelled off or fell and electricity prices climbed. However, US President Donald Trump's decision to freeze Inflation Reduction Act funding for green projects and withdraw the country from the Paris climate agreement have dampened the market.

According to the *Financial Times*, Deirdre Cooper, Head of sustainable equity at global investment manager Ninety One, said pessimism hanging over the decarbonisation sector was "exceptional" and mismatched with underlying company performance.

"Companies that we hold in the decarbonisation sector have seen strong growth and stable returns, but they have underperformed in terms of share price," she said.

"I have never seen such bearishness in terms of the valuation for companies with structural growth… The market is assuming no growth for decarbonisation [i.e. the sector]."

According to analysts at S&P Dow Jones Indices, underperformance was in part driven by several ongoing challenges such as the interest rate and inflationary environment, meaning higher project costs and policy uncertainty, which impact the clean energy sector.

After peaking in early 2021, the S&P Global Clean Energy Index started to fall steadily as interest rates rose, with clean energy projects particularly vulnerable to higher borrowing costs due to high upfront costs.

# ABB and Charbone Hydrogen agree to advance North American green hydrogen production facilities

ABB and Charbone Hydrogen Corporation – an integrated green hydrogen production company based in Montreal, Canada – have signed a Memorandum of Understanding (MoU) to collaborate on the development of up to 15 modular and scalable green hydrogen production facilities across North America over the next five years, providing a clean fuel source for existing hydrogen users and heavy industrial processes, which currently use grey hydrogen as an energy source.

The MoU positions ABB as the preferred supplier for the design, engineering, fabrication, testing and supply of modular and standard electrical substations (eHouses) for the interconnection between production facilities and local utilities. ABB will support Charbone in standardising basic engineering for systems and components across its project portfolio, to increase energy efficiency and reliability. Future scope may also see ABB operate as the main automation, electrification and telecom contractor depending on project requirements.

Among the sites covered by the collaboration is Charbone's flagship Sorel-Tracy facility near Montreal in Québec, Canada. The facility is expected to be connected to the Hydro-Québec grid by the end of quarter two in 2025, using hydro electricity to power green hydrogen electrolysers. The plant will create a blueprint for the design and engineering of modular and scalable equipment for other sites being developed by Charbone. The next project to get underway will be in the greater Detroit area in the US, which is the manufacturing base for major automotive companies.

"This strategic collaboration with ABB is a strong and significant signal about our proposition for the North American green hydrogen market," said Daniel Charette, Chief Operating Officer of Charbone Hydrogen Corporation. "With the Sorel-Tracy project moving quickly to on-site activities, and the capabilities of plug and play modular approach to get production starting in a minimal number of weeks, Charbone will support the decarbonisation of industry."

# Tenders, Bids & Contracts

## Americas

### Canadian 94 MW wind farm order for Nordex

An order has been placed with the Nordex Group for the supply and installation of 16 N163/5.X turbines. The 94 MW order also includes the servicing of the turbines for 25 years.

The project is located in Nova Scotia for an undisclosed customer. Nordex will supply the cold-climate turbines for the project from mid-2026, each with a nominal output of 5.9 MW. The turbines will be installed on 125 m tubular steel towers and will be equipped with an anti-icing system for the rotor blades.

### GE Vernova to equip two Texas wind farms

GE Vernova has won a contract from RWE to supply 109 of its 2.8 MW-127m onshore wind turbines to power the Honey Mesquite wind farm in Glasscock County, Texas, USA and to repower the Forest Creek wind farm near Big Spring, Texas.

Deliveries of the wind turbines for both projects are scheduled to begin later this year.

### Brazilian wind farm order for Nordex

Brazil's Auren Energia has commissioned the Nordex Group to supply and install 19 N163/5.X turbines at the Cajuina 3 wind farm. The 112 MW order includes the service for the turbines for an initial period of 15 years, with several options to extend up to 30 years.

The Cajuína 3 wind farm is part of the Cajuína Wind Complex in the state of Rio Grande do Norte in the municipality of Lajes. The turbines are due to be installed at the start of 2026, with commissioning scheduled later that year. The turbines will be supplied in an operating mode of 5.9 MW on 120 m concrete towers.

### Wärtsilä converts Brazilian sugar cane to clean power

Wärtsilä has partnered with Brazil's Energetica Suape II, majority owned by Grupo Econômico 4M, to conduct a world-first clean energy trial, which will see ethanol produced from sugar cane to generate power.

The trial will take place at the Suape II power station in Recife, Brazil. This will be the world's first test of an ethanol-fuelled engine for large-scale electricity generation.

Brazil is the largest producer and user of ethanol from sugar cane. This test aims to demonstrate the potential for this fuel as a large-scale power source.

## Asia-Pacific

### Indonesia to build two floating solar power plants

The Indonesian Ministry of Public Works has announced that it will develop two floating solar power plants at dammed reservoirs, due to be operational in 2027.

The Jatigede hydropower plant at the Jatigede Dam in West Java has two 55 MW units, and has the potential for a 100 MW floating solar power plant.

Lilik Retno Cahyadiningsih, Director General of Water Resources at the Ministry of Public Works, said that the project will work in conjunction with PLN, the state electricity company. He said: "It might take another two to three years for the floating solar plant to start operation. If there is a dam that is important and prioritised for operation by PLN, maybe the time can be expedited."

### NTPC invests in 20 GW of renewables

NTPC has signed two MOUs with the Indian state government of Madhya Pradesh to invest $23 billion in renewable energy projects in the state.

Under the terms of the first MOU signed with Madhya Pradesh Power Generating Company (MPPGCL), $13.8 billion will be invested in the development of up to 20 GW of renewable energy capacity, including pumped storage hydropower, wind, and solar.

NTPC will also allocate $9.2 billion to develop non-fossil fuel power plants in the state, including $460 million to construct an 800 MW pumped storage hydropower plant. The timelines for these projects have not been disclosed.

### Siemens supplying gas turbines to Taiwan

Siemens Energy is supplying two gas turbines and related components for the 1200 MW Kuo Kuang 2 power plant in Taiwan.

Siemens Energy's scope of supply is a complete power island solution including two SGT6-9000HL gas turbines, one SST6-5000 steam turbine, three SGEN6-2000P generators and the Omnivise T3000 control system.

Electricity demand in Taiwan is expected to rise by 12-13 per cent by 2030. Taiwan is expanding clean power generation and upgrading the grid to balance reliability and sustainability. The commissioning of the new power plant will allow for older, $CO_2$-intensive plants to be taken off the grid.

### BHEL wins €1.27 billion Chhattisgarh contract

Indian state-run Bharat Heavy Electricals Ltd (BHEL) has received a Letter of Intent (LOI) from Chhattisgarh State Power Generation Company (CSPGCL) for the EPC contract of the 2x660 MW Korba West Supercritical Thermal Power Plant.

The project, valued at €1.27 billion, is located at the Hasdeo Thermal Power Station in the Korba district of Chhattisgarh.

The scope of the project includes the supply of supercritical equipment such as the boiler, turbine, generator, and associated auxiliaries, along with electrical, C&I, and balance of plant. BHEL will also be responsible for erection and commissioning, as well as civil works.

The project is scheduled for commercial operation by 2030.

### Energy storage system for WESS in Australia

EnergyAustralia has awarded a contract to Wärtsilä for 350 MW/1474 MWh of storage capacity to the Wooreen Energy Storage System (WESS) in Victoria, Australia. The system to provide grid stability and support the integration of renewable energy. The scope of the contract includes engineering design, supply, commissioning, and a 15-year service agreement.

The site will be built adjacent to EnergyAustralia's Jeeralang Power Station and become operational before the shutdown of the coal fired Yallourn Power Station due to retire in 2028. Construction will begin in 2025 and the WESS will be completed in 2027.

The Wooreen energy storage system will utilise Wärtsilä's Quantum High Energy technology and GEMS Digital Energy Platform.

## Europe

### German 62 MW order for Vestas

Vestas has won a contract for the 62 MW Profen II wind farm, located in Saxony and Saxony-Anhalt, Germany. The order was awarded by MIBRAG GmbH, a subsidiary of Energetický a průmyslový holding (EPH). The contract consists of 10 V162-6.2 MW turbines.

The contract also includes a 20-year service agreement. Delivery is scheduled to start in Q1 2026, with commissioning due by Q1 2027.

In addition, Vestas won an order for 11 V150-6.0 MW units in 5.6 MW operating mode for Ørsted Wind Power. The project is the 62 MW Bahren West II wind farm in Brandenburg, Germany. The contract includes a 20-year service agreement.

Delivery is planned to start in Q4 2026, with commissioning scheduled for Q2 2027.

### Andritz wins 100 MW green hydrogen order

Andritz has secured an order to engineer a 100 MW green hydrogen plant in Rostock, Germany. The order was given by Rostock EnergyPort Cooperation (REPCO). REPCO is a joint venture of RWE Generation, EnBW Neue Energien, RheinEnergie, and Rostock Port.

Once the Notice-to-Proceed is received, Andritz will deliver the green hydrogen plant on an EPC basis. The supply package encompasses the green hydrogen production facility, supporting infrastructure and utilities, hydrogen purification and compression systems, storage units, and a hydrogen filling station. The plant is expected to be commissioned in 2027.

REPCO's green hydrogen plant will be integrated with the Hydrogen Core Network, a dedicated pipeline system designed for hydrogen transport across European nations, set to become operational in 2028. Additionally, the plant will serve local industries and the mobility sector.

### National Grid awards framework contracts

National Grid has awarded two parts of a £59 billion High Voltage Direct Current (HVDC) supply chain framework to deliver the required works and equipment needed for key energy projects across the country.

Six HVDC cable suppliers have been awarded positions on the Framework Agreement totalling £21.3 billion, and four suppliers awarded places on the HVDC Converter Framework totalling £24.6 billion.

The successful HVDC cable suppliers are Hellenic & Jan De Nul Consortium, LS Cable & System, NKT Cables, Prysmian Group, Sumitomo Electric and Taihan Cable & Solution. The HVDC converter systems Framework has been awarded to GE Vernova, Hitachi Energy, Mitsubishi Electric and Siemens Energy. Contracts have been secured for a five-year period, with the potential to extend for a further three years.

Suppliers on the framework will support the delivery of early projects including Eastern Green Link 4, Sealink, Lionlink and other projects of a similar size and nature.

### Voith Hydro to lead Lochay repowering

SSE Renewables has announced it will invest £70 million over the next three years to repower the 45 MW Lochay hydropower station, located in Killin, Perthshire, Scotland.

The upgrade is intended to modernise the facility with new turbine technology and extending its operational life by 40 years. The plant currently generates 170 GWh annually.

The refurbishment will replace all the main generation components and enhance the output without requiring additional water volumes. The existing civil infrastructure will be retained.

Construction will begin in April 2025. Voith Hydro will be the lead mechanical and electrical contractor for the refurbishment. Global Infrastructure has been awarded the contract for enabling works. AJT Engineering will design and install an automatic self-closing valve.

The project is scheduled for completion by 2028.

## International

### Saudi awards large CCGT contracts

A consortium comprising Korea's Doosan Enerbility and Sepco3 has won a $1.5 billion order to build two combined cycle gas turbine (CCGT) power plants in Saudi Arabia. The two plants are Rumah 1 and Nairyah 1, which will have a total combined capacity of 3600 MW.

The project scope includes development, financing, construction, ownership and operation of these plants. The contract was awarded by the developer consortium of Acwa Power, Korea Electric Power Corporation (Kepco) and Saudi Electricity Company (SEC).

Meanwhile, Siemens Energy and Harbin Electric International have been awarded a $1.6 billion contract to deliver the 1800 MW Rumah 2 and the 1800 MW Nairyah 2 projects. Siemens will provide key technologies and Harbin will be the EPC contractor. Siemens Energy will supply six SGT6-9000HL gas turbines, four SST6-5000 steam turbines, eight SGen6-3000W generators, two SGen6-2000P generators, and associated auxiliary equipment.

The project includes long-term maintenance agreements to support the plants' operational reliability over the next 25 years.

### MAN Energy signs EDF PEI maintenance contract

MAN Energy Solutions has signed a partnership agreement with EDF PEI, involved in power generation in island regions. The agreement runs until 2031.

MAN will be responsible for engine and auxiliary maintenance operations for EDF's power generation plants on Guadeloupe, Martinique, Reunion and Corsica.

There are three elements to the partnership agreement: supply and delivery of spare parts for the four power plants; turnkey maintenance services for engines, turbo-compressors, alternators, and unit or unit auxiliaries; additional maintenance services, including corrective maintenance, spare-parts refurbishment, supervision of maintenance operations, and the supply and delivery of spare parts.

The three power plants are powered by 12 × MAN 18V48/60 engines, and the Corsican plant by 7 × MAN 18V51/60 engines.

Hydrogen

# TotalEnergies, RWE agree on hydrogen supply deal for Germany's Leuna refinery

Global power generator RWE has signed an agreement with TotalEnergies for the supply of 30 000 tonnes per year of green hydrogen for the international energy operator's refinery at Leuna in Germany. The contract runs for 15 years and will eliminate 300 000 tonnes per year of carbon emissions during that time.

Gary Lakes

An important agreement has been reached by two major international companies regarding the supply of green hydrogen to a plant based in Central Europe.

Germany's RWE has signed with France's TotalEnergies an agreement covering the supply of 30 000 tonnes per year of green hydrogen to the TotalEnergies-operated refinery at Leuna in the central German state of Saxony-Anhalt for a 15-year period beginning in 2030.

RWE will supply the green hydrogen directly to the 227 000 bpd capacity refinery through a 600 km pipeline running from the company's electrolyser in Lingen, Germany. The green hydrogen will enable the cracking facility to reduce carbon dioxide emissions by 300 000 tons per year over the duration of the agreement, which was signed in early March by TotalEnergies SE and RWE AG, a German energy company and renewables energy developer.

The agreement marks the largest quantity of green hydrogen ever to be committed to production by a German electrolyser. TotalEnergies' contract for long-term offtake makes it an anchor customer for the RWE AG facility and was a factor in RWE AG's final investment decision (FID) made six months ago to proceed with building a 300 MW electrolysis plant and have it commissioned in 2027.

The agreement is a signal for the German market because fuel suppliers such as refineries are encouraged to gradually reduce their greenhouse gas emissions over time, RWE said in a statement.

RWE operates its electrolysers with electricity from renewable energy sources. Under EU law, these electrolysers may only be operated with renewable electricity generated in the same hour as the hydrogen. In order to be able to reliably supply the contractually agreed hydrogen even at times when there is little sun and wind, RWE Generation will use booked capacities of the hydrogen storage facility in Gronau-Epe. A subsidiary of RWE, RWE Gas Storage West, plans to put this facility into operation in 2027.

Germany's hydrogen core network will facilitate the supply of green hydrogen from Lingen to the Leuna refinery. The core network will connect ideal hydrogen production sites, such as Lingen in Lower Saxony, with large centres of industrial hydrogen consumption, such as Leuna. The network is made up of more than 9000 km of pipeline that will be phased into operation between 2025 and 2032 by both repurposing existing gas pipelines and building sections of new pipelines.

In a statement, TotalEnergies expressed its commitment to reducing the carbon footprint of producing, converting and supplying energy to its customers. "One of the pathways identified by the company is using low-carbon hydrogen to decarbonise its European refineries, a move that should help reduce its annual $CO_2$ emissions by around three million tonnes by 2030," TotalEnergies said.

In order to fully decarbonise the hydrogen the company uses in its European refineries, it has already contracted more than 200 000 tonnes of various forms of green and renewable hydrogen a year for its sites at La Mède, Grandpuits and Normandy in France, in Leuna in Germany, for its northern European refineries and in Antwerp in Belgium and in Zeeland in the Netherlands.

Refineries use large quantities of hydrogen, but it mainly is generated by natural gas, causing high $CO_2$ emissions. In Germany, fuel suppliers are encouraged to gradually reduce the greenhouse gas emissions (GHG) generated by their fuels, for example by 25 per cent by 2030. The use of green hydrogen is one way for refineries to prevent $CO_2$ emissions and thus meet their GHG quota.

Meanwhile, the EU's Director-General for Climate Action has reported that the European Hydrogen Bank's second auction for the production of renewable hydrogen attracted 61 bids from projects in 11 countries within the European Economic Area (EEA). Eight of the bids were submitted under the dedicated maritime topic by hydrogen producers with off-takers in the maritime sector, Climate Action reported.

The total grant support requested is more than €4.8 billion, four times the available budget of €1.2 billion provided by the Innovation Fund. All bids taken together account for a total electrolyser capacity of around 6.3 GWe. Over ten years, these projects would produce more than 7.3 million tonnes of renewable hydrogen. On a yearly basis, this would cover 7 per cent of the EU's REPowerEU ambition for domestic renewable hydrogen production in 2030.

In its first auction in 2023, the Innovation Fund allocated €694 million in grants to support six projects producing hydrogen that qualifies as Renewable Fuels of Non-Biological Origin (RFNBO), meaning it is generated using renewable electricity and meets the EU's sustainability criteria.

The Innovation Fund has also allocated more than €12 billion to more than 200 innovative projects across different sectors through its previous general calls for proposals.

Gas

# Natural gas remains key source of energy to 2050 and beyond, says GECF

Natural gas will remain a key source of energy for the foreseeable future, according to the latest outlook produced by the Gas Export Countries Forum (GECF). The 9th edition of the 'Global Gas Outlook', launched last month, focuses on the significant role gas will continue to play as the world moves deeper into its energy transition.

Gary Lakes

Natural gas, its source, production, transportation, supply, cost and consumption, has been a contentious issue for many year. In 2025 it continues to remain so as many countries, such as those in Europe, work to secure supply but also launch projects and policies designed to phase out its role in energy generation in the decades ahead. Meanwhile, other countries plan to use more of it for the sake of reducing their reliance on coal, and producers explore and develop new reserves, knowing that despite reducing the use of fossil fuels, which is essential for overall global health, natural gas sales earn big money for them.

The 'Global Gas Outlook' is loaded with statistics and projections pertaining to all sectors of the international gas industry, as the industry addresses what is commonly known as the energy trilemma, which is: energy security, energy equity, and environmental sustainability.

According to the report, global primary energy demand is projected to grow steadily, driven by economic expansion in developing countries. Global primary energy demand is projected to increase by 18 per cent over the forecast period, rising from 635 EJ in 2023 to 750 EJ by 2050, with no peak expected. An EJ is an exajoule. One exajoule is 24 times bigger than a megatonne of oil equivalent. 1 Exajoule = 23.8845896627496 megatonne of Oil Equivalent. The term is vital in contexts such as renewable energy and global energy statistics.)

The Asia Pacific will drive nearly half (49 per cent) of the total demand growth, followed by Africa at 25 per cent, the Outlook said. While the share of fossil fuels is set to decline from nearly 80 per cent in 2023 to 64 per cent by 2050, they will remain the foundation of global energy supply, the report said.

The GECF projected that natural gas demand is expected to grow by 32 per cent by mid-century, surpassing coal as the second largest energy source by the late 2030s and converging with oil at 26 per cent of the energy mix by 2050. Renewables are set to be the fastest-growing energy source, expanding from just 3 per cent in 2023 to 17 per cent by 2050, reflecting increasing investment and policy support, the report said.

Natural gas demand is projected to increase from 4018 billion cubic metres (bcm) in 2023 to 5317 bcm by 2050, representing 32 per cent growth over the forecast period, the Outlook said. The share of natural gas in the global energy mix will rise from 23 per cent to 26 per cent.

This expansion will be driven by the power sector, adding 475 bcm (1.1 per cent per annum) to reach 1866 bcm. Industrial demand, including feedstock applications, is expected to grow by 238 bcm (0.9 per cent per annum) to 1095 bcm, maintaining its position as the second-largest source of natural gas consumption, the report said.

Natural gas demand for hydrogen production is also set to rise significantly over the next two decades, with consumption exceeding 480 bcm by 2050, reflecting blue hydrogen's growing role in global decarbonisation strategies.

The share of natural gas in final energy consumption is projected to reach 16 per cent by 2050, slightly increasing from 15 per cent in 2023, despite shifting consumption patterns. A gradual transition is underway, with natural gas use shifting from direct consumption in end-use sectors toward transformation sectors such as power generation and hydrogen production, reinforcing its role in supporting cleaner energy systems, the Outlook said.

Global natural gas trade is projected to grow by 44 per cent from 2023 to 2050, reaching 1743 bcm, equivalent to one-third of global gas demand, according to the Outlook projection. The super-cold liquified gas will dominate, the report said, doubling its volume to 800 metric tonnes and accounting for 63 per cent of traded gas by mid-century.

While pipeline trade is anticipated to decline initially, modest growth is expected as Eurasian exports pivot from Europe to the Asia Pacific, driven by rising demand in China. Eurasia and North America are poised to drive natural gas export growth, according to the report, with North America expanding LNG capacity and Eurasia advancing both LNG and pipeline projects. Africa is set to become a key supplier, while the Middle East will sustain a steady export contribution.

By 2050, GECF member countries are projected to supply approximately 869 bcm of natural gas exports, increasing their market share to around 50 per cent from 40 per cent in 2023. LNG exports from these countries are expected to reach about 445 metric tonnes, accounting for 56 per cent of global LNG exports.

Asia Pacific is expected to dominate LNG imports, accounting for 76 per cent of global volumes by 2050, with China, South Asia, and Southeast Asia driving the growth. The region is expected to contribute 88 per cent of gross global LNG imports increase, adding 343 metric tonnes, solidifying its role as the primary destination for LNG in the long run.

# Grids in crisis: a wake-up call for Europe

The transmission grid congestion crisis in the Netherlands is a clear signal of what's to come across Europe. Univers' **Ynse de Boer** argues that without urgent action, economic growth could slow, energy investments could stall, and climate targets could slip further out of reach.

Across Europe, governments and businesses are moving to adopt clean energy. But in the Netherlands, a crisis-in-slow-motion threatens to stall this progress – grid congestion. Left unaddressed, this challenge could derail economic growth, jeopardise climate targets, and set a dangerous precedent for Europe.

Grid congestion arises when the electricity infrastructure cannot accommodate the influx of power, particularly from renewable sources like wind and solar, and deliver it when and where it's needed. In the Netherlands, the grid is at capacity, with operators like TenneT and Liander estimating wait times of up to 10 years for businesses to secure a connection or expansion. A study by BCG and Ecorys calculates the damage of grid congestion to the economy of the Netherlands at up to €40 billion annually.

This isn't just a Dutch problem – it's a warning for Europe at large.

### A harbinger for Europe

As other European countries ramp up renewables and electrification, they risk falling into the same trap: a grid unable to handle the future it was built to power.

- Germany has seen renewable production hit record highs, yet grid limitations routinely force wind farms in the north to curtail generation because the electricity can't be transported efficiently to demand-heavy regions in the south. In 2023 alone, these constraints led to the curtailment of approximately 19 TWh of renewable energy – enough to power over 5.6 million German households for a year.
- France, traditionally reliant on nuclear power, faces a different challenge. While nuclear offers steady supply, integrating decentralised renewable sources like solar and wind requires a more flexible, modernised grid. Without significant upgrades, France risks grid congestion that could stall its clean energy transition.
- In the UK, growing demand from electric vehicle (EV) adoption and home electrification is placing unprecedented strain on the grid. The UK's National Grid forecasts that peak electricity demand could rise up to 50 per cent by 2035. Without strategic investments in grid capacity and energy storage, congestion will become inevitable.

These examples underscore why the Dutch crisis is a clear signal of what's to come across Europe. Without urgent action, economic growth could slow, energy investments could stall, and climate targets could slip further out of reach.

**Failing to heed the lesson from the Netherlands, could cost Europe tens of billions of euros annually, says de Boer**

### Rethinking the grid

At the heart of this looming grid congestion crisis lies the transition to an increasingly variable and decentralised energy system.

Wind farms, solar parks, large-scale battery installations, and EV charging infrastructure interact with the grid, generating and consuming clean electricity at scale. This increases variability and spreads power generation more widely across the network.

However, much of Europe's grid infrastructure was designed for a centralised energy system, where large power plants – coal, nuclear, or gas – delivered electricity steadily to homes and businesses.

This old-style infrastructure struggles to cope with the surge of intermittent renewable energy being fed into the system, at ever more geographically dispersed points like remote wind farms or rooftop solar installations all over the map.

The result is a grid ill-equipped to transport power efficiently from where it's generated to where it's needed most, leading to imbalances, wasted clean energy, and, ultimately, bottlenecks that stall progress and economic growth.

While investments in grid upgrades and cross-border infrastructure projects are underway, they remain insufficient to meet the rapid surge in demand and decentralisation of energy supply.

Eurelectric estimates that Europe will need to double grid capacity by 2050 to integrate variable renewable generation and decentralised assets. Yet current investment levels fall far short, with only 30 cents invested in grid development for every euro spent on clean energy generation – when it should be closer to 67 cents.

To prevent grid congestion from derailing the energy transition, Europe must look beyond large-scale grid upgrades and embrace decentralised energy solutions.

### Decentralised solutions

First, technologies such as microgrids, battery storage, and behind-the-meter systems allow businesses and communities to generate and store energy locally, easing pressure on overstretched national grids.

By integrating renewable sources like rooftop solar and pairing them with on-site batteries, companies can stabilise supply and increase independence from grid infrastructure constraints.

Second, an equally important strategy is the adoption of intelligent software to connect with all the energy system's component parts and to optimise energy flows and balance supply and demand in real-time.

Combinations of such systems can store surplus energy, such as excess solar power generated during the day, and release it during periods of peak demand.

A prime example comes from the Netherlands' largest supermarket chain, Albert Heijn, which faced grid constraints as it electrifies its vehicle fleet, and turned to Univers, global market leader in software to manage advanced new energy systems.

To overcome its grid constraints and electrify its fleet, Albert Heijn installed an energy infrastructure that includes on-site power generation, battery storage, and EV charging. Univers deployed their software platform to integrate the component parts of Albert Heijn's energy infrastructure and provide automated, real-time control. Connected through IoT and orchestrated by AI, the system not only ensures Albert Heijn's fleet remains operational but also reduces strain on the national grid.

Such innovations not only maximise the efficiency and effectiveness of existing grid capacity but also create more flexible, resilient energy systems capable of meeting the demands of a rapidly electrifying and growing economy.

### A race against time

The Dutch case demonstrates what happens when grid congestion reaches its breaking point.

Businesses face delays or outright refusals for new power connections or expansions. Industrial parks can't electrify operations, and companies keen to scale up sustainable energy projects are left in limbo and postpone or cancel their investments.

When businesses can't access power, they cannot grow. When renewable energy is curtailed, their economics become less favourable and emissions targets slip further out of reach.

For the rest of Europe, this is not a distant issue. As renewable energy adoption accelerates and electrification grows, policymakers, grid operators, and businesses must treat grid modernisation as a priority, not an afterthought.

The stakes are high: grid congestion is not just about energy – it's about economic growth, environmental progress, and Europe's ability to lead the global transition to clean energy.

Companies like Albert Heijn and Univers are already tackling these challenges by integrating decentralised energy solutions that reduce reliance on overburdened grids.

As an independent investor, advisor, and (non-) executive director in climate technology businesses– and a former Managing Director of Accenture's Sustainability Services – I see firsthand how smarter energy systems are critical to ensuring Europe doesn't stagnate in its clean energy ambitions.

If we fail to heed the lesson from the Netherlands, the annual cost could reach tens of billions of euros – and time that neither businesses nor the climate can afford to lose.

*Ynse de Boer is Global Sustainability Lead at Univers.*

# Unlocking EV flexibility: a win-win for consumers and the grid

The flexibility potential of EVs is huge. But the road ahead demands bold action, clear regulatory direction and a commitment to innovation, says Eurelectric's

**Kristian Ruby**

Last month I picked up my first electric vehicle. Was it expensive? Yes, but I knew I would recover part of the cost by saving on fuel expenses for the rest of the vehicles' lifetime. What's more, I knew I could further reduce costs by smart charging my vehicle and providing flexibility to the local grid. In time, I should even be able to make money out of my EV battery by selling stored electricity back to the grid thanks to bidirectional charging.

EVs are much more than merely a means of transportation. Essentially, they are batteries on wheels that can be key flexibility assets for the power system and reward the owners. Their batteries, when charged intelligently, can serve as distributed energy storage systems. Through unidirectional smart charging, consumers can shift their charging away from peak demand, when electricity is more expensive, to when clean power supply is abundant and prices are lower based on time-of-use tariffs (ToU).

Vehicle-to-grid (V2G) technology goes one step further as it allows the energy stored in the vehicle's battery to be fed back into the grid in exchange for financial renumeration.

By 2030, EV batteries could make available an estimated 114 TWh of battery capacity to balance the grid – shows Eurelectric's recent report on e-mobility conducted with EY. To put numbers into perspective, this capacity could meet approximately 4 per cent of Europe's projected annual demand, enough to power 30 million homes every year. Yet this potential remains largely untapped today.

**Ruby: EVs are much more than merely a means of transport; they are batteries on wheels that can be key flexibility assets for the power system**

### A new paradigm

Although the EV uptake is growing, it has not yet reached mass market adoption. EV sales registered a slowdown in 2024, accounting for 22.7 per cent of new car registrations and 8 per cent of new vans. However, sales are already picking up in 2025 with battery electric vehicles (BEVs) making up 15 per cent of the market share, up from 10.9 per cent in January 2024, according to ACEA.

High upfront costs still represent a key barrier for European consumers *vis-a-vis* their fuel alternatives. For this reason, the Commission's initiatives to stimulate EV demand with a corporate fleet initiative and social leasing schemes can help foster demand for Europe's electric cars in a world where the competition is much more fierce.

As the pace of adoption accelerates, tapping into EVs flexibility potential means transforming millions of parked vehicles into decentralised, flexible energy storage solutions. This is a transformative opportunity for grid operators as flexibility needs in Europe will double in the next five years, with more renewables entering the system and end-use sectors electrifying. Their flexibility can help balance the grid by smoothing out renewables' intermittency and even help mitigate the need for new grid infrastructure investments to the tune of €4 billion savings per year, Eurelectric's 'Grids for Speed' study demonstrates.

It is also an exciting opportunity for consumers to enjoy the benefits of clean mobility while also contributing to grid stability and earning monetary rewards as flexibility providers. Through smart charging, a driver of an SUV in France could save on average 29 per cent – about €2900 – every year on the vehicle's total cost of ownership.

To fully capitalise on this, we must figure out ways to monetise flexibility and create a clear value proposition for consumers.

### Breaking down the barriers

Five key challenges currently stand in the way of fully leveraging EVs as flexible energy assets:

*1. Limited market readiness to integrate flexibility:* Flexibility markets and clear price signals are needed for EV drivers to participate in smart charging and V2G at scale. Yet, EU countries are at different levels of market readiness to integrate these services. Some markets, for instance, maintain very high minimum bid sizes, restrictive aggregation conditions and low remuneration potential, hampering demand-side flexibility. The low-hanging fruit here would be to swiftly implement the Electricity Market Design reform (EMD) which lowers the minimum bid size for the day ahead and intra-day market, as well as mandates energy suppliers to offer Time-of-Use (ToU) tariffs.

Moreover, current taxation structures can penalise EV owners by double-taxing energy used for both stationary and mobile storage. Revising the European Taxation Directive (ETD) to tax solely end use energy consumption, matched by proper metering, will remove this disincentive. Phasing out subsidies and fiscal incentives for fossil fuels will further shift the economic balance in favour of cleaner, more flexible energy solutions.

*2. Low customer awareness:* Providing flexibility services through unidirectional and bidirectional charging can seem too technical for EV owners, as it is asking them to be more active participants in the electricity market and turn their transportation mode into an energy asset. Therefore, the role of the customer cannot go understated, making it imperative for greater simplification and consumer awareness raising.

*3. Grid investments:* A robust, digitalised distribution grid is the backbone of any flexibility solution. Currently, 30 per cent of Europe's low voltage distribution grids are more than 40 years old. EVs and other distributed energy sources will only increase complexity to manage the electricity grid. Distribution system operators (DSOs) should therefore be able to make the necessary investments to expand and modernise the infrastructure. Investing in real-time digital monitoring and network modelling will be especially important to achieve granular visibility over the low-voltage grid to better integrate EVs dispersed loads, manage local congestion and partially offset infrastructure buildout needs.

*4. Siloed data:* Data is the lifeblood of the e-mobility ecosystem. Yet, regulatory and interoperability issues are keeping part of this data in silos, preventing seamless communication between EVs, charging infrastructure and grid operators – reports Eurelectric's 'Data Interoperability' study. Policymakers must establish uniform data protocols and standards to provide full access to key in-vehicle data, including battery state-of-charge, at no additional cost. To this end, the in-vehicle data act adopted last year should be urgently implemented. This will empower consumers to decide who manages their EV charging and ensure grid operators have reliable information to optimise energy flows.

*5. V2G compatibility issues:* The availability of V2G-compatible cars today is limited, with V2G capable chargers five to ten times more expensive than unidirectional chargers. Furthermore, most V2G chargers on the market are direct current (DC), which, as standard, have higher prices than alternating current (AC) chargers. Those recently launched AC V2G-capable chargers are only compatible with EV models with a bidirectional onboard charger. That's why all new EVs should be equipped with bidirectional chargers that can both draw from and feed energy into the grid. The new network code on demand response, currently being developed, will be crucial to support V2G technologies adoption, as it will set common technical rules for EVs to be integrated as distributed energy resources into the low-voltage grid.

### The open road head

The evidence is clear: the flexibility potential of EVs is immense. Unlocking it is not a question of if, but how and when. With proactive policy measures and coordinated industry efforts, the integration of unidirectional smart charging and V2G can deliver significant environmental, social and economic benefits.

The path forward demands bold action, clear regulatory direction and a commitment to innovation. For the energy industry, embracing the flexibility of EVs is not just an opportunity – it is an imperative to drive home the benefits of EVs for consumers.

*Kristian Ruby is Secretary General at Eurelectric.*

# US opposition to clean energy could drive investment elsewhere

While the US' discouraging stance on renewables might deter both local and overseas investors, as global clean energy markets surge it could offer substantial opportunities elsewhere.

**Joseph Jacobelli**

The US has proven to be a highly attractive destination for clean energy investment capital over the past few years. The sector accounted for almost one-sixth of global clean energy investment in 2023, according to the International Energy Agency (IEA), though it remains a major investor in oil and gas. It amounted to $280 billion in 2023, up 40 per cent from 2020, says the IEA.

Clean energy investments are computed in slightly different ways by different organisations. A report by the Rhodium Group/MIT-Center for Energy and Environmental Policy Research calculated investment reached $274 billion in 2024, up from just $75 billion in 2018; the data comprises clean technologies investments in the retail, energy, industry, and manufacturing sectors. Solar deployment and electric vehicle sales in the US broke records in 2023 and 2024, and renewables now dominate new power generation capacity, while new domestic clean energy manufacturing facilities are being constructed nationwide.

The massive number of clean energy investment opportunities created in the US in recent years was principally due to favourable policies by the Biden presidency. The administration's tenure had unprecedented policy support for such investments, exemplified by momentous legislation such as the Bipartisan Infrastructure Act and the Inflation Reduction Act. These created a beneficial environment for significant investments, offering financial incentives and regulatory support.

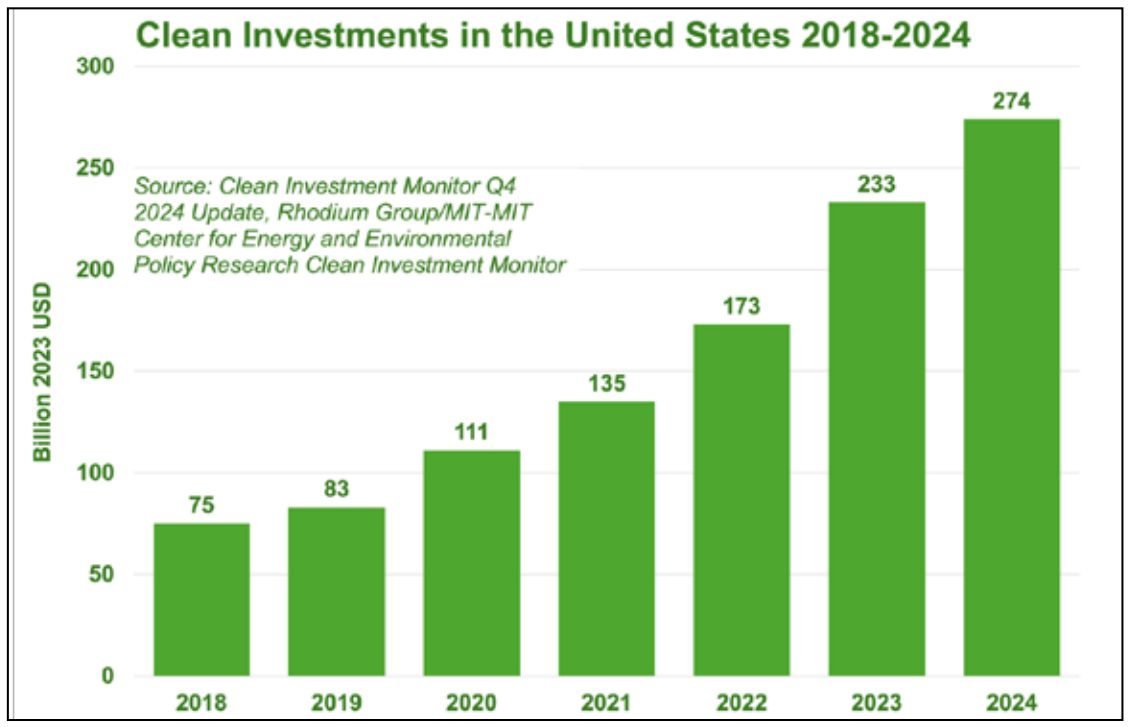
Under the new federal administration, several obstacles to the growth of the clean energy sector have arisen. Three key examples highlight these issues.

The first challenge is high uncertainty in federal policy. The Trump 2.0 presidency has kicked off with policy rollbacks, especially in the form of weaker renewables support, including tax credit cuts, while fossil fuel regulations are relaxed, focusing on oil and gas expansion over federal clean energy incentives. There is a risk that Federal Energy Regulatory Commission policies will favour fossil fuels in transmission markets. Admittedly, it is still early days, and sharp policy U-turns could be seen in the future.

The second hurdle is whether there will be legal battles between the federal government and some districts and states over supporting policies for clean energy – even by those districts and states held by Republicans.

The Rhodium Group/MIT research notes that from the third quarter of 2022 to the end of 2024, out of the $289 billion in total clean energy-related investment, 77 per cent occurred in districts represented by Republicans. Furthermore, of the anticipated outstanding investment pipeline of $524 billion, $402 billion is expected in these districts, also 77 per cent, up until mid-March 2025.

Legal battles will make domestic and international investors nervous. Some experts believe that some Republican lawmakers could oppose efforts that endanger clean energy investments in their states. Will they? At this juncture this is a real uncertainty.




**Clean investments in the US 2018-2024. Investment reached $274 billion in 2024, up from just $75 billion in 2018**

A third barrier is specific to wind energy. Trump has often criticised wind projects, especially offshore ones. Trump's executive order hurts wind development as it calls for a temporary stoppage on federal leases and permit issuance. Projects will probably face a slowdown in obtaining permits, which will likely be exacerbated as the new administration sharply cuts staffing at various regulatory agencies.

The other more positive sign of the coin is the counter-argument by some experts that federal government interventions may have limited direct influence on clean energy-related projects adoption. The primary drivers should remain state-level policies and market dynamics, with local governments and private sector actors playing pivotal roles in technological implementation and investment strategies. Additionally, some observers note that the current climate may foster acquisitions. Private equity firms such as Brookfield and KKR have already shown interest, according to the media outlet Semafor.

There are early signs of investor nervousness. At a high level, the existing US macroeconomic and political environment generates much uncertainty. The Conference Board's US economic outlook for 2024 to 2026 points to a real GDP growth rate slowdown by as much as one percentage point compared to 2024 (quarterly growth in 2024: 2.5-2.9 per cent, 2025 estimated at 1.5-2.5 per cent, and 2026 at 1.5-1.8 per cent). Current federal interest rates of 4.5 per cent are 100 basis points lower than the peak but still remain high – they were just 0.25 per cent in early 2022, while the number of further cuts remains uncertain but should surely be limited.

The well-publicised additional import tariffs Trump wants to apply is a concern to investors as well. While stock markets are a very short-term indicator, year to mid-March European stock markets (like the Stoxx 600 Index) and some Asian stock markets (like the Hong Kong Hang Seng Index) have substantially outperformed US ones.

There has been a substantial outflow of capital from US stock markets in favour of European, Asian, and others. As the *Financial Times* noted on March 21, 2025: *"Europe's new growth story is coinciding with a stumble, or worse, by the US. America's economy is slowing while the Trump administration's chaotic policymaking, particularly on tariffs, has sapped confidence in the future of the much-vaunted 'US exceptionalism'."*

Could this be good news for clean energy investments elsewhere? With less clean technologies-focused capital dedicated to the US markets, there could be more direct investment flowing into Europe, Asia, and other regions.

Also, if the US reduces its demand for new clean energy-related projects (including clean technologies manufacturing), could this alleviate cost pressures on supply chains globally? Especially equipment and input materials such as rare earths and other commodities? Might this result in lower costs for solar panels, wind turbines, and batteries in Asia, Europe, and beyond? A positive answer would not be far-fetched albeit there is yet little evidence as it is still early days.

There are some early signs that this may be possible, especially on the capital allocation front. Several large clean energy projects in the country have been cancelled or postponed.

On day one in office, Trump halted construction of the nation's largest wind farm, the 1.2 GW Lava Ridge Wind Project, a 104 000-acre wind farm with 271 turbines in Lava Ridge, Idaho.

Soon after the inauguration on 20 January, the New Jersey Board of Public Utilities cancelled the bidding process for the state's fourth offshore wind solicitation, which had aimed at awarding between 1.2 to 4 GW of capacity with a price tag of several billion dollars. At the same time, 168 wind and solar projects permitting was temporarily paused by the US Army Corps of Engineers, which oversees the nation's wetlands. French utility EDF wrote down $940 million in the value of its stake in the Atlantic Shores wind energy project off New Jersey in February. This came after oil major Shell, its partner, pulled out of its $1 billion investment in January. Another oil major, BP, quit its application to connect the 2.5 GW Beacon Wind project to the grid in New York waters. In short, the picture is far from positive.

It is still too early to conclude that corporations, private equity firms, infrastructure funds, and others will refocus the deployment of capital in clean energy-related investments to Europe, Asia, or other jurisdictions. Many factors prevail. The target market must offer projects with attractive returns on investment. Apart from being consistent and transparent, regulation must be conducive to reducing red tape. The capital cannot wait around for months or years for all of the necessary permitting to be completed, something which many countries are guilty of. EU countries, as well as India, Indonesia, and Vietnam, are but a small sample in the list.

*Giuseppe 'Joseph' Jacobelli, head of single-family office Bougie Impact Capital Ltd., has over 30 years in energy markets. He raises climate finance awareness through his 'Asia Climate Finance Podcast' and publications, including his upcoming book, 'Powering the Unstoppable Green Shift'.*

**Jacobelli: Legal battles will make domestic and international investors nervous**

Junior Isles

# Time to amp up energy security

In times past, when speaking about energy and security, the conversation was all about system resilience and ensuring safe and reliable supply. How times change. While this still holds true, it's safe to say that as the geopolitical risk landscape has evolved, so too has the whole energy security discussion.

Although energy security has always been part of the trilemma of making energy reliable, sustainable and affordable, one speaker at the recent Chatham House Climate and Energy Summit in London pointed out that it is now literally in "the crosshairs".

Ben Parsons, a Partner at management consulting firm, Oaklin, first posed the question of whether accelerating the energy transition will help or hinder energy security. "For me, this really gets to the heart of some of the fundamental forces that have always been behind this transition, as well as some of the turbulence we've seen in geopolitics recently."

Taking us back some weeks to the night of February 24th, the third anniversary of Russia's invasion of Ukraine, Parsons explained: "I was sat in Kyiv train station that night with a group of British MPs, waiting to board a night train back to Poland. We'd been in Ukraine talking about, amongst other things, the critical role of energy security in Ukraine's war effort. That night as we waited for the train, we watched anti-aircraft fire exploding in the distance. It turned out to be one of the heaviest nights of bombing in the war so far and energy assets were absolutely in the crosshairs. And you need to ask why is that? I think it's because Russia has identified a strategic vulnerability."

Like so many countries around the world, Ukraine largely has a centralised power system with large power plants that make for large targets. Notably, one of the first items on the agenda in talks about a ceasefire, was power plants.

Parsons commented: "It could be different. Imagine a system that is based around inherently distributed decentralised renewables; one that's based on infrastructure alone and not a constant supply of fossil fuels. The fact that a sufficiently accurate missile to take out a wind turbine, costs far more than the wind turbine – it's a losing game. No one can switch off the sun and no country can stop the wind. That shift is a fundamental transition, not just about energy systems but in national security.

"Energy security was always there as part of the trilemma but was perhaps the least discussed and under-appreciated. And when we did talk about it, we often talked about security of fuel supply or price shocks; it wasn't about the fundamental re-architecting of our energy system."

Governments have long realised that power systems are potential targets, but these dangerous times has put them at the forefront of thinking. There were initial questions as to whether the recent fire at a substation that left London's Heathrow airport without power, was an act of terrorism. Although it proved not to be the case, there is now a firm link between power systems and national security.

Last month Germany's Bundestag voted in favour of a multibillion-euro package which loosens borrowing limits and allows new investments in defence, infrastructure and climate change. Commenting on the announcement, Gareth Redmond-King, Head of International Programme at the Energy and Climate Intelligence Unit (ECIU) said: "This is a clear signal from the newly elected government of the third biggest economy in the world, that defence and climate are not either/or, but two sides of the same coin. This significant change to Germany's fiscal rules, enabling urgent investment in interconnected national and global security threats could set a precedent for other nations, including the UK."

It is the clearest sign yet that the need for renewables is now recognised as more than being just about tackling climate change.

At COP28 in 2023, government leaders pledged to work together to triple the world's installed renewable energy generation capacity to at least 11 000 GW by 2030. The UK is among the leaders in the clean energy charge.

Sanjeet Sanghera, Head of Strategic Futures Strategy and Policy, National Energy System Operator (NESO) pointed to a recent report that explained how the UK's 2030 mandate connects to that tripling.

NESO's analysis indicates that renewable energy capacity must expand significantly, with offshore wind increasing from 15 GW to 28-35 GW, onshore wind doubling from 13 GW to 27 GW, and solar power tripling from 15 GW to 47 GW to meet clean power goals by 2030.

The plan will mean reducing unabated natural gas fired generation in the system from about one third down to 5 per cent.

"There are two challenges in doing this," said Sanghera. "One, is displacing the TWh of energy with a clean source. The second, is dealing with the balancing problem. Natural gas has very fast ramp rates, can supply peak demand and deal with [times of] low renewables. For the first problem what you find is that you have to triple renewables… For the balancing question… you have to ramp-up demand side flexibility, rather than solely relying on the supply side. This means more batteries, more interconnectors, more dynamic demand."

Flexing the demand side was a large part of the discussion at Eurelectric's EVision conference in Brussels last month. The event saw the launch of a report produced by EY in collaboration with Eurelectric that, among other things, showed how EVs can help address the flexibility problem.

According to the report, within five years Europe will need more than double today's flexibility resources, just to keep up with changing electricity supply and demand. Compared with 2021, demand for flexibility requirements will increase sharply, up 2.4-fold on a daily basis (from 153 TWh), 1.8-fold on a weekly basis (from 137 TWh) and 1.3-fold on a seasonal basis (from 132 TWh). From 2030 to 2050, the need for flexibility is projected to triple.

Serge Colle, EY Global Power & Utilities Leader, said: "As our power systems becomes more driven by renewables – intermittent or variable generation – inevitably we need more flexibility. So, we've been looking at our forecasts for where things will be by around 2030. It's very clear that the need for flexibility will at least double. And between 2030 and 2050, flexibility requirements will triple again against the 2030 number. We believe that [electric] cars are an incredible asset to solving [the problem of] flexibility."

Yet Europe faces challenges in accelerating EV adoption. Cost of purchase still remains high and charging infrastructure is inadequate. There is also the issue of having to rely on China and other countries for the critical minerals needed for EV batteries, and other clean technologies such as wind and solar.

Several speakers spoke frankly under the Chatham House Rule at the summit in London, highlighting how critical minerals are essentially being weaponised by governments. It is another issue that has brought a new dimension to the energy security discussion.

Pointing to US President Donald Trump's aspiration to make Canada a US state and also own Greenland, one speaker said: "Why buy a country's minerals when you can buy the country itself? Or at least attempt to buy the country itself?" This, along with his insistence on a minerals deal, including oil and gas, with Ukraine, is evidence of Trump's desire to eliminate any reliance on China, while giving the US a key position in the global market for critical minerals and rare earths.

Critical minerals and energy commodities have long been part of trade and investment deals. China has invested in Africa in return for investment. But as the transition to clean energy continues, there is every chance that geopolitical tensions around the sector will heighten. And as those tensions intensify, energy security and national security will become increasingly inseparable. Clean energy is now firmly centre stage.


*Cartoon by Jem Soar*