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Azerbaijan plans massive clean energy investment

Petrostate Azerbaijan enhanced its green energy credentials at the COP29 Climate Summit. During the summit, hosted in its capital, Baku, the government signed several deals that highlight its desire to embrace clean energy. *Page 6*

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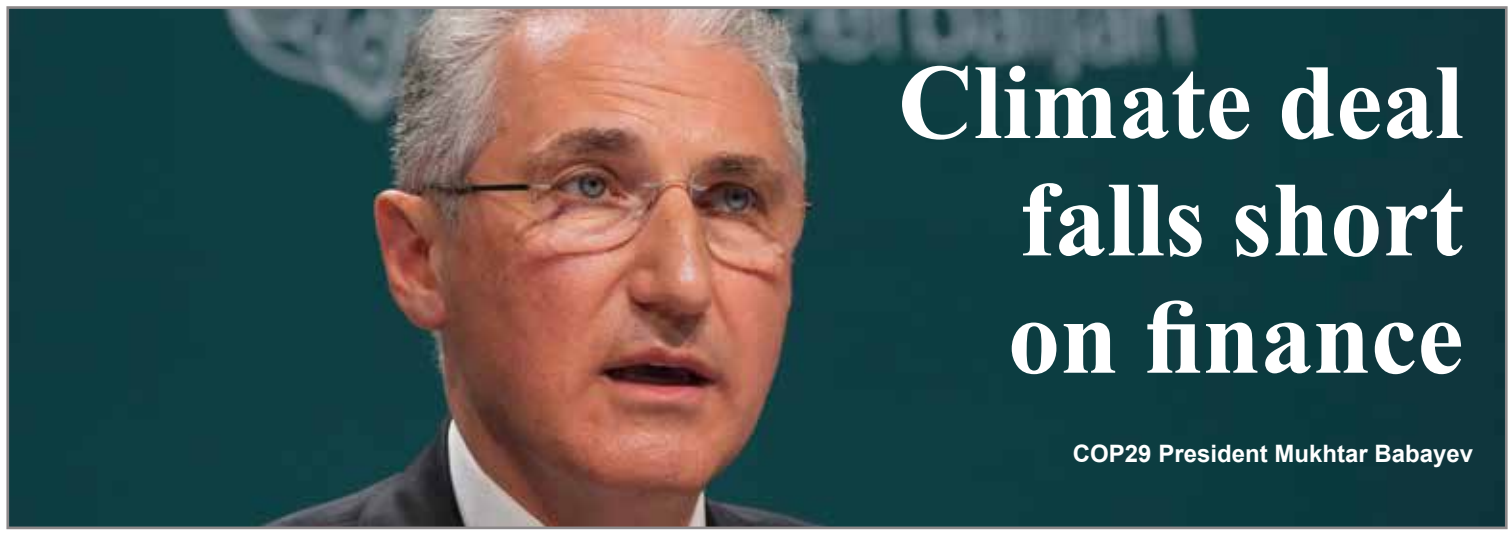
Shares in renewable energy companies slumped last month over fears that the re-election of Donald Trump will put the brakes on the sector. *Page 7*

Energy Transition Investment Series

Portugal is a living laboratory for global decarbonisation. The country's economy and credit profile have improved significantly over the past decade but despite its achievements, investing in renewable energy projects presents notable challenges. *Page 14*



Climate deal falls short on finance

COP29 President Mukhtar Babayev

Although finance was seen as the main focus of the COP29 Climate Summit in Azerbaijan, global climate negotiators again fell short on agreeing on what is needed. **Junior Isles**

Developing countries were forced to accept a finance package to help them tackle climate change, which many at the recent COP29 climate summit in Baku, Azerbaijan, see as inadequate.

Negotiations were salvaged from the brink of collapse after wealthy nations agreed to offer $300 billion annually, still well short of the more than $1 trillion that experts say is needed.

The summit almost collapsed twice as vulnerable nations walked out of negotiations more than 24 hours after the summit was due to close, and ended with India objecting fiercely as the gavel came down to officially close the talks and seal the deal.

Indian delegation member Chandni Raina said the country was "extremely disappointed" by the abrupt passage of the agreement, adding: "This was stage-managed". "It is a paltry sum. I am sorry to say that we cannot accept it. We seek a much higher ambition from developed countries." The agreement was "nothing more than an optical illusion", she added.

India's outburst was followed by objections from Bolivia, Chile and Nigeria, who were told by COP29 President Mukhtar Babayev that their statements were noted.

Smaller nations, such as Malawi, Fiji and the Maldives, also voiced their disappointment. Cuba noted that the $300 billion was less than the previous goal of $100 billion agreed more than a decade ago, taking into account inflation.

European Union Climate Commissioner Wopke Hoekstra tried to assure disappointed smaller nations, saying he was "confident we will reach the $1.3 trillion" economists say developing countries need to shift to green energy and cope with climate change.

Under the deal agreed by almost 200 countries, wealthy nations said they would take the lead in providing "at least" $300 billion in climate finance by 2035 to help developing countries cope with climate change. Although well short of the of the $500 billion which G77 group of developing nations had sought, it was an improvement on the initial $250 billion offered.

Avinash Persaud, an adviser to the Inter-American Development Bank said finance goal was "at the boundary between what is politically achievable today in developed countries and what would make a difference in

Continued on Page 2

Global alliance will drive transition to clean power

The G20 Leaders' Summit in Brazil saw the launch of the Global Clean Power Alliance (GCPA) – a new diplomatic grouping focused on driving the global transition to clean power.

Led by the UK, with 12 signatories thus far and support from the US and EU, the alliance will initially focus on a 'mission' to mobilise significantly scaled up energy transition finance, with more missions to come.

Leo Roberts, E3G Programme Lead Coal to Clean, said: "Following its ambitious NDC *[see page 5]* , the UK is bringing leadership in the race to deliver clean power globally, in line with the global commitment to transition away from fossil fuels made at COP28. The GCPA situates the UK centrally in driving political action to address the chronic financing challenges faced by many Global South countries. It now needs to set some clear, ambitious goals for finance mobilisation, and show how it will leverage existing and new diplomatic alliances to drive political leadership and action on the ground."

The Alliance was first announced by the UK government Foreign Secretary David Lammy on September 17th to help speed up the global shift to renewable energy by sharing technology and financial resources.

Responding to the announcement, Rebecca Newsom, Senior Political Advisor at Greenpeace UK, said: "The goals of tripling renewables and doubling energy efficiency by 2030 will be reached faster through strong international collaboration, which this alliance could help with. It should prioritise knowledge-sharing, collective purchasing and enhancing routes to market in emerging economies for renewables, as well as encouraging the interconnection of national and regional electricity grids.

"To avoid making the debt crisis in many developing countries even worse, financial support from developed countries should be provided in the form of highly concessional grants and loans. Billions of dollars in public funding could be unlocked by taxing the most polluting industries, such as the fossil fuel sector, to make polluters pay. This would help propel the 'transition away from fossil fuels' agreed at COP28 that must remain front and centre of efforts to tackle climate change."

Another recent initiative seen as key in the international climate change movement, is the 'Baku' Priority International Actions launched by the Breakthrough Agenda. The pact made at the COP29 Summit in Azerbaijan is aimed at accelerating progress on climate change and enhancing collaboration in preparation for COP30 in Brazil.

More than 60 governments representing 80 per cent of global emissions came together at COP29 in support of the Breakthrough Agenda to strengthen international collaboration across more than 150 international initiatives and accelerate action ahead of COP30.

Countries have aligned on key areas of international collaboration for the Breakthrough Sectors, developing the 'Baku' Priority International Actions across the road transport, power, steel, buildings and hydrogen sectors. These actions build on the outcomes of COP28 and COP29, driving progress towards COP30.

While there has been good progress in improved international collaboration, stronger, coordinated action is required in areas including investment, R&D, demand generation and the deployment of new technologies.

The Actions support key high-level commitments made at COP29, such as the COP29 Presidency's Hydrogen Action Declaration, the COP29 Global Pledge on Scaling International Assistance for Industry Decarbonisation, the Global Energy Storage and Grids Pledge, and the first annual update of the Global Zero Emissions Vehicles Transition Roadmap.

Since COP28, the number of countries supporting the Breakthrough Agenda has risen to 61, covering over 80 per cent of global emissions, with Kazakhstan and Singapore joining the Hydrogen Breakthrough at COP29.

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developing countries".

Falling short on adequate finance was just one of the shortfalls of what was, as always, a fractious affair.

Notably, it also failed to make any progress in an agreement to transition away from fossil fuels. Several people involved in the talks said that countries led by Saudi Arabia and Russia had made efforts to block any references to advancing last year's agreement to transition away from fossil fuels.

"Maybe they've been emboldened by [Donald] Trump's victory, but they're acting recklessly here," said Alden Meyer, a Senior Associate at E3G, a London-based climate research organisation that was at the negotiations. "They're being a real wrecking ball."

Germany accused the petrostate host Azerbaijan of backing attempts by fossil fuel producing countries to hijack the summit. Annalena Baerbock, Germany's foreign affairs minister, had warned that a "few fossil fuel states" were attempting a "geopolitical power play".

In her COP29 closing statement, UNEP Executive Director Inger Andersen, warned: "Climate crunch time is here. COP29 has delivered a hard-fought deal. This is at a time when science tells us that without action, climate impacts will only intensify further. COP29 has now secured a foundation on which we must now rapidly build. However, we must be clear, ambition and promises are only as good as the action and delivery that backs them up.

"We therefore need to see more transparent, inclusive progress on finance, on mitigation and on adaptation. UN Environment Programme will continue to work with all parties and stakeholders to ensure that climate finance is mobilised in the most effective way, with maximum impact on the ground for communities that need it the most."

Andersen said all eyes must now turn to the NDC 3.0 February deadline and urged all member states to "now stretch ambition to ensure we can live up to the 1.5°C promise".

Andersen says all eyes must now turn to NDC 3.0

She said: "The NDC plans can unleash a wave of resilient economic growth, new jobs and address cost of living challenges. The G20 must lead, and lead quickly. The road to Belém must be one of concerted action and living up to commitments. There is no other way."

Twenty-five countries and the EU have now pledged not to build any new unabated coal power plants in their next round of national climate plans in a bid to scale up ambitions in the next phase of climate action.

The 'no new unabated coal power' COP29 initiative was signed by EU climate envoy Wopke Hoekstra to pledge that when the 25 nations submit their national climate plans by February 2025 along with all other nations party to the Paris Agreement, theirs will reflect no new unabated coal in their respective energy systems to accelerate phasing out of fossil fuels.

US urged to stay in Paris Agreement

- Russia "sure" withdrawal is not the right move
- China hopes co-operation on global climate action will continue

Junior isles

US President-elect Donald Trump has been urged to remain in the Paris Agreement by several countries – including some that have historically resisted the shift from fossil fuels to renewables.

During the UN Conference of Parties (COP) 29th Climate Summit in Baku, Azerbaijan last month, China, Russia and Saudi Arabia all called on Trump – who has promised to pull the US out of the global agreement on climate change when he takes up office in January – to remain within the UN pact.

Boris Titov, Russian President Vladimir Putin's special representative for international cooperation in sustainability, told the *Financial Times* he was "sure it is not" the right move to leave the Agreement.

"We have to work with the Paris Agreement…we cannot withdraw from Paris but we can make it more efficient," he said.

In contrast to the incoming Trump administration, China's government is a solid believer in the need for global cooperation on what is a global challenge.

Liu Zhenmin, China's climate envoy, said he hoped "cooperation on global climate action will continue to be enhanced" between the world's two biggest economies.

"Climate change is now a pressing global challenge that demands a collective response from the international community," Liu told summit delegates.

China has been criticised in the past for hindering climate change negotiations but is making significant progress in rolling out renewables and clean energy technology to tackle emissions. Now, the country, which is the world's largest emitter alongside the US, is under pressure to take up a leadership role in climate action following Trump's election.

Saudi Arabia, long regarded as a block to negotiations at COP summits, also stressed why it was crucial to remain within the Agreement. Its climate envoy, Khalid Almehaid, Deputy Minister of Sustainability and Climate Change and chief climate negotiator, said that the 2015 Paris Agreement had posed a "great challenge" but that his country had decided it wanted to be "part of the train".

"We are part of the train," he said, but added: "… we are going to make sure that we are going to be a leader." He pointed out that Saudi Arabia is focusing on renewable energy, energy efficiency and how to capture greenhouse gas emissions from fossil fuels.

Almehaid said that by the end of this year, the country would have 44 GW in renewable energy, up from less than 1 GW in 2022. "If Saudi Arabia can transition, I think anyone in the world can transition," he said, "We would like to see all oil producer [countries] follow suit in making sure they really do fully integrate climate change and future transition."

Meanwhile, the EU voiced concerns about a domino effect if Trump quits the Paris Agreement, after Argentina pulled its negotiators out of the talks in Baku. EU officials are also concerned over the possibility of the US withdrawing from the 1992 parent treaty, the UN Framework Convention on Climate Change.

Writing in the *FT*, Laurence Tubian, Chief Executive of the European Climate Foundation and France's special representative for COP21, called for calm. He said Donald Trump's election victory "is undoubtedly a challenging setback" but noted that in 2017, when Trump announced the US would leave the Paris Agreement, "it did not trigger the domino effect that he hoped for".

Tubian wrote: "Quite the opposite: many countries redoubled their commitment, and China in particular saw an opportunity to accelerate its leadership and competitive advantage in green technology."

Today, the case for staying committed to the Paris Agreement is even stronger, he said, noting that the International Energy Agency expects the global market for key clean technologies to triple to more than $2 trillion by 2035.

"This is not a time for panic, but for resolve," wrote Tubian. "Those of us committed to tackling the climate crisis anticipated this; we haven't been blindsided as in 2016. We are well prepared. We have economic logic, a critical mass of countries, and public support on our side."

Carbon trading deal, despite likely US pull-back from climate fight

Negotiators at the COP29 climate summit in Baku, Azerbaijan, agreed a deal to launch multi-billion dollar carbon markets governed by UN rules on emissions.

It was the first notable breakthrough at the summit and came despite the threat that US President-elect Donald Trump will withdraw from the Paris Climate Agreement.

Carbon trading could help raise some of the cash that developing countries will need to adapt to the effects of climate change, while helping big polluters cut their emissions.

Negotiators at the summit reached a consensus on standards for the creation of carbon credits under Article 6.4 of the Paris Agreement. This will enable climate action by increasing demand for carbon credits and ensure that the international carbon market operates with integrity under the supervision of the United Nations.

The COP29 Presidency had identified the full operationalisation of Article 6 as a key negotiating priority this year. Finalising Article 6 negotiations could reduce the cost of implementing national climate plans by $250 billion per year by enabling cooperation across borders.

The decision is seen as an essential step in achieving that goal.

Commenting on the agreement, COP29 President Mukhtar Babayev said: "This will be a game-changing tool to direct resources to the developing world. Following years of stalemate, the breakthroughs in Baku have now begun. But there is much more to deliver."

However, Sonya Bedford, Partner at law firm Spencer West LLP warned: "The impact and ultimate success of the agreement will depend on what the carbon credits are used to incentivise in the first place. For example, more renewable energy or energy efficiency initiatives. It also depends on whether there is then a market for the carbon credits which then drives more renewables and decarbonisation. If these conditions are satisfied, then the agreement is ultimately a good thing.

"We will need to see more policy and criteria for the carbon credits to avoid 'greenwashing' and stringent criteria and a regulatory market will need to be in place. If the higher polluting countries – those who would gain carbon credits – are not able to undertake their own projects, then this is a positive step."

Countries still clinging on to fossil fuels

Too many countries are prolonging the use of fossil fuels, despite the rapid expansion of renewable energy, according to the latest Climate Change Performance Index CPPI).

The CPPI, which ranks states' climate protection measures, evaluated 63 countries plus the European Union that are responsible for 90 per cent of global greenhouse gas emissions.

Of the countries analysed, it noted that 42 countries' current per capita emissions are not aligned with the Paris goal of limiting global average temperature rise to 1.5ºC.

Commenting on the findings, Niklas Höhne of German climate policy think-tank NewClimate Institute and report co-author, said: "The world is at a turning point. Peak of global emissions is closely in sight. But states need to act quickly to drastically cut emissions and prevent further dangerous consequences of climate change." He added that the Index shows "how big the resistance from the fossil fuel lobby is".

The countries that ranked worst in the CCPI – Iran, Saudi Arabia, the United Arab Emirates and Russia – are also among the largest oil and gas producers in the world. The share of renewables in their respective energy mixes is under 3 per cent, the analysis found, with the countries showing "no signs of departing from fossil fuels as a business model".

Countries that received a high ranking included Norway, Sweden, Luxembourg, Estonia and Portugal, alongside the Philippines, Morocco, Chile and the world's most populous country, India.

The CPPI also showed that 61 have managed to increase the share of green energy sources, like wind and solar, in their energy mixes over the last five years. Launching the report at the UN climate summit in Azerbaijan, lead author Jan Burck from environment NGO Germanwatch said: "Renewables are in the fast lane, especially in the electricity sector. In addition, there is an increasing electrification of the mobility, residential and industrial sectors. The trend towards electrification is continuing."

The 'EI Statistical Review of World Energy', released just ahead of COP29, highlighted the complex variety of energy and emissions stories unfolding in economies around the world.

The Country Transition Tracker, which plots the relative progress of around 80 of the world's largest energy consuming countries along eight metrics, revealed that 42 of the 70 itemised countries have reduced their energy-related CO_2e emissions since 2017, the first full year after the Paris Agreement was ratified. It also showed that 50 out of 79 countries have reduced their fossil fuel consumption.

Mexico electricity system reopens to private investors

■ Generation concessions to be awarded by auction ■ New rules for renewable energy generators

Janet Wood

In a shift from her predecessor, Mexican President Claudia Sheinbaum has announced plans to allow private sector participation in Mexico's electricity industry.

The private sector will be allowed to participate in the generation and sale of electricity, via bid processes if participants can demonstrate compliance with the reliability and backup requirements of the National Energy Plan.

However, private sector participation in the electricity generation market will be limited to 46 per cent, with the majority of generation – 54 per cent – from state company Federal Electricity Commission (CFE). She emphasised that the recent reform, which reversed part of the privatisation of CFE in 2013, had partially "returned to the people of Mexico" the CFE and oil company Pemex.

Sheinbaum's energy plan estimates private sector investment to be between $6-9 billion and electric generation in the range of 6400 MW to 9550 MW during her six-year term.

The new plans were outlined by Luz Elena González, Secretary of Energy, who set out several options for participation, including an auction-based allocation of concessions to deliver energy and capacity directly to CFE. Private investment in clean energies (solar or wind) will have to comply with the Renewable Grid Code and secondary regulations.

President Sheinbaum said that CFE and the Ministry of Energy are working on rules for private participation for renewable generators in the electricity market, which may include requirements to include batteries and to manage intermittency. The President said that before constitutional reform was approved, and before President Andrés Manuel López Obrador, private renewable energy generators could automatically export their power and were not required to pay for the transmission grid.

Daniela Medina, Sustainability Manager of the Mexican Wind Energy Association (Amdee), said the renewable energy sector has about 30 projects on hold representing investment of $10-15 billion.

"These projects were not cancelled, they were just paused, precisely because of the lack of clear rules and legal certainty, since it has not been possible to move forward," explained Medina. Amdee, which represents more than 40 companies in the wind energy sector in Mexico, said that at least seven wind farms totalling 800 MW have not been able to connect to the electricity grid.

Medina said that the sector also needs a clear scheme for transmission costs, known as porting, which would reduce costs and improve the competitiveness of renewable energies.

The Secretary of Energy also said self-generating homes and small businesses will not be required to obtain a licence for installations rated below 700 kW.

Nine firms in Colombia's offshore wind tender

Colombia, South America's second most popluated country, has launched the continent's first offshore wind lease tender and nine companies have submitted pre-qualification applications in the first stage.

The tender will make sea areas available for between 1 GW and 3 GW, according to the Colombian Mining and Energy Ministry. Winners will be awarded permits to develop their wind projects in shallow and deep sea areas off the coasts of the departments of Atlantico, Bolivar, southern Magdalena and northern Sucre.

Two bidders are Colombian – they are oil major Ecopetrol and power company Celsia.

The other bidders include offshore wind players BlueFloat Energy (Spain), Copenhagen Infrastructure Partners (Denmark), Jan de Nul and DEME (Belgium), PowerChina and China Three Gorges Corporation (China) and Dyna Energy (UK).

The final list of qualified bidders is expected to be available by December 2024. The selected companies will submit their bids in the first half of 2025, the ministry said.

Colombia's national hydrocarbons agency ANH has been tasked with evaluating and selecting the bidders, with national maritime authority DIMAR and the Mining and Energy Ministry.

Colombia's offshore wind road map highlights 12 200 km^2 that can be used for turbine installations. Its offshore wind potential is estimated at 50 GW. In the most optimistic scenario, Colombia could have 1 GW of offshore wind farms by 2030 and up to 9 GW by 2050.

Green hydrogen project in Uruguay includes solar and storage

A group of companies in Uruguay has recently begun construction of the Kahiros green hydrogen production plant in Fray Bentos, Rio Negro department, which will use solar power to produce hydrogen, which will be used to fuel heavy transport.

The 8.4 ha site brings together a 4.8 MWp solar farm, a 2 MW PEM electrolyser with an estimated annual production of 76 700 kg of hydrogen per year. The hydrogen will be stored at high pressure and supplied to trucks at a station planned to be installed next to the production plant. It will be connected to UTE's 31.5 kV medium voltage network located on the site.

The first customers for the hydrogen will be fuel-cell powered trucks carrying wood for local company Montes del Plata.

The $40 million investment in Kahirós was agreed with the support of Santander. Gustavo Trelles, Country Head of in Uruguay, called the initiative a "milestone". He said: "The European Union announced that US18 billion will come (to Uruguay) and I hope they do, but the $40 million are already here and are a reality."

Uruguay's second, larger, hydrogen product in Paysandú, which would produce e-fuels from green hydrogen, is in the pipeline.

Nuclear on the agenda in Central and South America

■ Jamaica signs MoU with Canada
■ El Salvador expresses interest in SMRs

Janet Wood

Recently Jamaica signed a Memorandum of Understanding (MoU) with Canadian-based 'Atomic Energy of Canada Limited' and 'Canadian Nuclear Laboratories Limited' with the aim of advancing the implementation of nuclear technologies in the Caribbean island. Jamaican Prime Minister Andrew Holness said the partnership reflects his government's commitment to diversify the country's energy portfolio with clean and sustainable alternatives.

"This is a pivotal moment in Jamaica's energy transformation as we take a bold and forward-looking step by signing this Memorandum of Understanding," Holness said. "Today's nuclear technology, especially small modular reactors, is much safer and more adaptable than in the past.

He noted that Jamaica's journey with nuclear technology began in 1984 when it installed a research reactor at the University of the West Indies, with the support of the European Union (EU).

"We have come a long way in diversifying our energy mix. We've done exceptionally well integrating solar, wind and natural gas, and we have some hydroelectric power... but there's a long way to go," Holness added.

Small modular reactors (SMRs) have also prompted interest from Daniel Álvarez, El Salvador's General Director of Energy, Hydrocarbons and Mines and President of CEL. He said he wants to have nuclear generation of up to 100 MW.

During a recent panel that discussed the future of nuclear energy in Latin America, he pointed out: "In seven years we want to have the research reactor, at least, and then, to have a power reactor."

Recently, El Salvador's legislative assembly approved a Nuclear Energy Law, which also allows for creation of an Agency for the Implementation of the Nuclear Energy Program in El Salvador (OIPEN).

At the same panel, Pedro Maffia, Director of Institutional Management of Brazil's National Nuclear Energy Commission, another of the panel's speakers, explained that nuclear generation represents 2 per cent of his country's electricity consumption. "It is clean, safe and stable energy," he said.

Jorge Molina, Director of the Regulatory and Nuclear Authority (ARRN) of Paraguay, told the panel that his idea would not be to start with a research reactor. Instead the country would move directly to generation. But he acknowledged that it has not yet been decided whether this can be done, because it must go through a study on whether the country has the appropriate infrastructure to install nuclear energy.

One country where nuclear expansion is currently off the agenda is Mexico. The country has two nuclear units in operation but incoming President Claudia Sheinbaum expressed concern about the technology.

Hydro starts to power up, wave energy wins permit

Canada's BC Hydro has begun generating electricity from the first of six generating units at a hydropower plant located in northeastern British Columbia.

It said recently that the reservoir at the plant is now more than 90 per cent full and it expects that the Site C hydroelectric plant will be in full service by fall 2025.

Construction of project was first launched in 2015, and was built while cost estimates have risen from $6.6 billion in 2007 to $16 billion in 2021.

Meanwhile 'wet' renewables had a boost in the USA when Eco Wave Power Global received a Nationwide Permit from the U.S. Army Corps of Engineers for its wave energy project at AltaSea's premises at the Port of Los Angeles.

The project is set to become the first onshore wave energy installation in the USA.

The permit will allow Eco Wave Power to install eight wave energy floaters on the piles of an existing concrete wharf structure on the east side of Municipal Pier One.

"We are thrilled to receive this final permit and move one step closer to bringing wave energy to the US," commented Inna Braverman, Founder and Chief Executive Officer of Eco Wave Power.

Indonesia announces major clean energy initiatives

- Plans to develop 'green transmission line'
- Country targets 60 GW from hydropower, geothermal, solar, and wind sources

Junior Isles

Indonesia unveiled a raft of measures at last month's COP29 Climate Summit, which will help accelerate the country's green energy growth.

Speaking at the World Leaders Climate Action Summit (WLCAS) at tge 29th UN Climatic Change Conference (COP29) in Baku, Azerbaijan, Hashim Djojohadikusuomo, Special Envoy of the President of Indonesia said the nation plans to develop a 70 000 km long Green Transmission Line to support the energy transmission to the most populated islands; set up "Green Smart grid infrastructure" to double the capacity of wind and solar power; and setup 60 GW of hydropower, geothermal, solar and wind power.

Indonesia's increased ambition is a step towards realising the President's vision of economic growth above 8 per cent through green, resilient, and inclusive economic development. By 2040, Indonesia aims to have 75 per cent of the country's electricity capacity come from renewable sources.

The government announced €1.2 billion in green funding for the Indonesian power sector from German state development bank Kreditanstalt für Wiederaufbau (KfW). The funding was marked by the signing of a Memorandum of Understanding (MoU) between PT PLN (Persero) and KfW.

Hashim emphasized that the government is committed to accelerating the energy transition.

"We have developed a new strategy over the next five years to achieve a minimum of 8 per cent sustainable economic growth," Hashim said, stressing that the development of clean energy sources is crucial for enhancing industrial competitiveness.

Over the next 15 years, Indonesia's renewable energy generation capacity is targeted to increase by 75 per cent from the total addition of 100 GW in electricity capacity. "We will be a major country fulfilling our responsibility to protect the environment's future. We deeply appreciate the established international cooperation as a joint effort toward reaching the Net Zero Emissions (NZE) target," Hashim added.

KfW Group's Sustainability Officer, Jurgen Kern, explained the KfW support for Indonesia represents Germany's commitment to international cooperation for green transformation. Further, Kern highlighted that PLN is at the centre of Indonesia's energy transition. PLN is strongly committed to greening the energy sector while ensuring reliable energy access.

"Therefore, we believe that Indonesia and Germany can continue strengthening their partnership in the energy sector, especially in clean energy projects like geothermal, hydropower, and transmission. Achieving the NZE target requires solid collaboration and partnership," Kern said.

In a separate announcement shortly after, the greenlight was given for a $7 billion gas development project that will later use carbon capture in the production process. BP and its partners gave the go-ahead as major energy companies continue to bank on demand for gas growing in the region.

The project is an additional development of the Tangguh liquefied natural gas project in Papua, which has been shipping LNG to Asian countries like Japan and China since 2009. BP holds a 40 per cent stake in the project, and will foot the equivalent portion of the $7 billion bill.

The project would look to develop the Ubadari gas field, which would feed into the LNG facility. The plan is to enhance gas recovery by capturing associated CO_2 from the field, then recompressing and injecting it to maintain pressure in a nearby reservoir.

This will be BP's first ever carbon capture, utilisation and storage project. Production at the field is expected to start in 2028, the British major said. Other partners in the project include China's CNOOC and Japan's Nippon Oil Exploration.

The decision to give the go-head comes as BP and its competitors scale back their renewable ambitions and bet on a future where fossil fuels will play a role in the global energy mix for longer. Oil and gas majors have been putting a renewed emphasis on LNG, seeing it as a fuel that can ease the transition away from coal and into renewable energy.

Philippines outlines major investment in grid stability and resilience

The National Grid Corporation of the Philippines (NGCP) is ready to implement more than 100 transmission projects worth over P600 billion ($10.2 billion) that are aimed at ensuring grid reliability and stability to prevent transmission-related outages.

In a press briefing, NGCP officials said the grid operator annually updates its Transmission Development Plan (TDP), which forms part of the Department of Energy's (DOE) Philippine Energy Plan.

Recently, the NGCP unveiled its long-term grid development plan in nationwide consultations. The consultations for North Luzon, South Luzon, Visayas, and Mindanao, gathered input and provided updates for the expansion and improvement of the nation's power grid under the proposed 2024-2050 TDP, which is a roadmap of transmission projects for the next 20 to 25 years.

The updated TDP is designed to address the needs of the power grid, ensuring its reliability and stability to prevent transmission-related outages. The public consultations also discussed NGCP's ongoing and future grid developments, including upgraded project timelines, regulatory status, integration of renewable energy sources, such as offshore wind plants, and the implementation of smart grid technologies for a more efficient and sustainable transmission system.

Following the news, NGCP announced that the Energy Regulatory Commission (ERC) authorised the country's grid operator to pursue three projects worth P38.09 billion that are seen as vital to boost the stability of the Luzon and Visayas grids.

India surpassing COP26 commitments as power sector emissions plummet

India's climate policies are exceeding expectations, with projected carbon dioxide emissions reductions of approximately 4 billion t between 2020 and 2030, significantly surpassing the nation's COP26 commitment of 1 billion t, according to a new report by the Council on Energy, Environment and Water (CEEW).

The Delhi-based think-tank's study reveals that existing policies have already yielded substantial results, with emissions reduced by 440 million t of CO_2 between 2015 and 2020.

The power sector is expected to see a 24 per cent decline in coal fired generation by 2030 compared to a scenario without current policies, effectively avoiding the installation of 80 GW of new coal fired power plants.

At the same time, the combined share of solar and wind power is projected to expand from 3 per cent in 2015 to 26 per cent by 2030, and further to 43 per cent by 2050. The shift is crucial for the world's fifth-largest economy, which currently relies on coal for about 71 per cent of its electricity generation.

CEEW CEO Arunabha Ghosh emphasised that while India has demonstrated significant climate leadership, continued bold action and international financial support will be crucial for achieving the country's 2070 net zero target.

Last month, NTPC Green Energy Limited (NGEL), a subsidiary of NTPC, announced plans to invest Rs5 trillion ($417 billion) by 2030 to lead India's clean energy transition.

The initiative will be funded by a Rs10 000 crore ($8.33 billion) initial public offering (IPO), enabling NGEL to advance projects in renewable power generation, green hydrogen, sustainable fuels, and energy storage.

UK bids to be global clean power leader

- Government makes commitment on decarbonisation
- NESO sets out plan for 'clean power 2030'

Janet Wood

Britain's Prime Minister Keir Starmer pledged at the recent COP29 climate summit in Azerbaijan to reduce the UK's emissions by 81 per cent compared with 1990 levels by 2035, in a bid to regain a global leadership role in decarbonisation.

The Prime Minister's promise was in line with the recommendation of the Climate Change Committee, which advises the UK governmemt on decarbonisation.

RenewableUK's Chief Executive Dan McGrail commented: "By setting this ambitious target, the Prime Minister is positioning the UK at the forefront of the global race for clean power which is ultimately better for billpayers and strengthens our energy security."

McGrail added: "The huge pipeline of new energy infrastructure which we can deliver at speed between now and 2035 is the key factor in enabling the UK to reach this bold new target."

A key role in delivering network infrastructure has recently been devolved to Great Britain's recently created independent National Energy System Operator (NESO). In a new study commissioned by the government, NESO considered whether and how the new Labour government can reach its flagship manifesto pledge of a 'clean power system' in 2030. It concludes that "urgent action" is needed to speed up permitting and construction of new infrastructure and attract investors to the sector. Offshore wind capacity would have to rise from 15 GW to 43-50 GW by 2030, onshore wind would have to rise from 14 GW to 27 GW and solar would need to rise from 15 GW to 47 GW.

The report sees the need for annual investment of more than £40 billion, to build around 2700 miles of offshore electricity cables and 620 miles of onshore cables. It concludes the overall costs of running the system in 2030 "should not increase for a clean power system".

Secretary of State Ed Miliband said the report was, "conclusive proof that the government's clean energy superpower mission is the right choice for the country". The government is "determined to ensure the significant reforms to planning and grid we need", he added.

Wind, solar and nuclear power supplied 51 per cent of Britain's electricity in 2023, but gas supplied 32 per cent, with very high contributions from gas on windless days. NESO's modelling suggests that gas will supply less than 5 per cent of power overall by 2030, but its contribution would be high on windless days. That is likely to be supplied by the existing gas fleet in 2030, possibly with carbon capture or fuelled with hydrogen instead of methane.

Networks want policymakers to support cybersecurity efforts

Eurelectric has called on policymakers to support moves to ensure electricity networks are secure against cyber attacks. The association, which represents Europe's electricity sector, said that since 2022, its cyber security centre had counted 48 publicly known attacks against European energy and supply companies, 31 ransomware attacks and 15 attacks affecting networks' operational technology

It called on policymakers to acknowledge and adequately reward the increased costs arising from cyber security measures and compliance of all cyber legislations, and of rectifying a shortage of cyber security professionals. It also asked for time to fully implement a new security framework before new regulations are added, and improved collaboration by mapping EU enforcement mechanisms and agencies to clarify the role that each one plays.

Meanwhile Greece's transmission system operator IPTO, has joined the European Network for Cyber Security, a non-profit membership organisation that brings together critical infrastructure stakeholders and security experts to deploy secure European critical energy grids and infrastructure.

Nikos Raftopoulos, Director of ICT and Cybersecurity at IPTO, said: "In today's fast-paced digital world, safeguarding the security of our power grid has become more essential than ever. Through our membership with ENCS, we strengthen our own cyber security measures while actively supporting Europe's collective efforts to secure the energy sector."

Hydrogen developments to demonstrate value to energy system

Efforts to support the creation of a hydrogen energy ecosystem are progressing, as Spain, Lithuania and Austria announced they are preparing to use the European Hydrogen Bank's (EHB's) 'Auctions-as-a-Service' scheme to deploy more than €700 million in national funds to support domestic renewable hydrogen production projects. This brings the total funding mobilised by the upcoming second EHB auction to almost €2 billion.

Lithuania wants to reach its national target of having 1.3 GW of electrolysis capacity and 129 kt of renewable hydrogen production annually by 2030.

The Auctions-as-a-Service scheme allows EU Member States to finance projects even after EU-wide funds have been fully allocated.

Meanwhile Lhyfe, in partnership with Energy Pool, is helping contribute to French grid stability, by offering a demand response service and selling on the secondary reserve market, using the flexibility of its electrolysis production sites. These balancing services, had not previously been provided by a hydrogen producer.

Also in France, HyPSTER, a first renewable hydrogen storage demonstrator in a salt cavern located in Etrez (France), has entered the operational phase after the first hydrogen molecules were injected into the EZ53 salt cavern. Several injections of hydrogen have now been carried out to confirm that the well is hydrogen-tight in successive stages throughout its depth.

Offshore wind projects set to increase in 2025

- Tenders due in North and Baltic seas
- Work to start on Denmark's largest project

Janet Wood

Work will start in spring 2025 on Denmark's 1.1 GW Thor offshore wind farm, after the Danish Energy Agency granted a construction permit to German energy company RWE.

Denmark's largest offshore wind farm will have 72 turbines and will be fully operational by the end of 2027. Work will begin as several other countries open tenders for wind farm projects in Europe's seas.

Twelve parties have been prequalified for France's ninth offshore wind tender, slated for award in autumn 2025 and commissioning between 2032 and 2034. They will be competing for three floating wind projects at Bretagne Sud 2 (400–550 MW), Golfe de Fos 2 (450-550 MW) and Narbonnaise 2 (450-550 MW), and a fixed-bottom or floating project at Oleron 2 (1-1.25 GW).

The list of selected developers includes BayWa re, EnBW Valeco Offshore, Iberdrola, Parkwind, RWE Eolien en Mer France and TotalEnergies. It also features one three-party consortium – Le Groupement Elicio, Q ENERGY and Kansai Electric, and five two-member teams – EDF Renouvelables and Maple Power; Ocean Winds and Banque des Territoires; Oxan Energy and Ingka Investments; Plenitude and Qair; and Skyborn and Octopus.

The Netherlands Enterprise Agency (RVO) has published draft regulations and plot decisions for a tender for the IJmuiden Ver Gamma and Nederwiek I areas, set to be tendered in September 2025. Previously planned as 4 GW over four sites, the Dutch Ministry of Climate Policy and Green Growth recently split the areas into four 1 GW sites, to reduce the financial risks for offshore wind farm developers.

RVO said it expected the permit application window to open and close by the end of the third quarter of 2025.

In the Baltic Sea, Lithuania's National Energy Regulatory Council (VERT) has announced it will award 700 MW of new offshore capacity in a tender re-launched with updated conditions after its first edition failed to attract enough proposals. Interested parties have until March 18, 2025, to register and submit documentation.

Meanwhile the Swedish government has rejected 13 applications to build offshore wind farms in the Baltic Sea with a potential capacity of almost 32 GW, citing defence concerns. It approved just one project on the west coast, being developed by a joint venture between Vattenfall and Zephyr.

"Based on the Armed Forces' documentation, the government makes the assessment that it would lead to unacceptable consequences for Sweden's military defence to build the projects in question. In the serious security policy situation Sweden now finds itself in, with war in our immediate area, the defence interest must weigh heavily when judgments like this are made," said Pål Jonson, Sweden's Minister of Defence.

Fusion projects and technology take steps towards commercialisation

The b.NEXT consortium (Assystem, Egis and Empresarios Agrupados) has won a multi-million Euro deal running for activities relating to design and construction management at ITER running until 2030.

The contract was signed with Fusion for Energy (F4E), the EU organisation managing Europe's contribution to major international fusion projects.

ITER – a collaboration between 33 countries – aims to demonstrate the feasibility of nuclear fusion by building the largest device using magnetic confinement. It brings together engineers and scientists from 35 countries.

Stéphane Aubarbier, Deputy CEO of Assystem, said: "The ITER project is the most ambitious nuclear research programme in recent decades." She added: "We are convinced that fusion technologies are crucial to maximising sustainable, low-carbon electricity production worldwide, while offering promising career prospects for current and future generations."

Meanwhile UK government-backed investor British Patient Capital has made an £8 million ($10 million) investment into Tokamak Energy as part of a $125 million financing round. British Patient Capital's investment was made through the £425 million Future Fund: Breakthrough programme.

The funding will help to accelerate plans to commercialise its high temperature superconducting technology solution, TE Magnetics, key for fusion development. The funding brings the total raised since forming as a spin-out from the UK Atomic Energy Authority in 2009 to $335 million, comprising $280 million from private investors and $60 million from the UK and US governments.

Azerbaijan plans massive clean energy investment

- SOCAR and Masdar to cooperate on wind energy from Caspian Sea
- Country targets 2 GW of renewables by 2027

Junior Isles

Petrostate, Azerbaijan, enhanced its green energy credentials at last month's COP29 Climate Summit. During the summit, hosted in its capital, Baku, the government signed several deals that highlight its desire to embrace clean energy.

The State Oil Company of Azerbaijan (SOCAR) signed a Memorandum of Understanding (MoU) with the Abu Dhabi Future Energy Company PJSC energy company 'Masdar' and Saudi ACWA Power to collaborate on wind energy production in Azerbaijan's sector of the Caspian Sea.

"As part of the project, the first offshore wind power plants in Azerbaijan will be built," SOCAR's press service reported. The total capacity of these plants is planned to reach 3.5 GW.

Earlier, during the opening of the COP29 summit, Azerbaijani President Ilham Aliyev stated that the renewable energy potential in the Caspian Sea is 157 GW. He also noted that by 2030, Azerbaijan plans to build solar, wind, and hydroelectric power stations with a combined capacity of around 6 GW.

Masdar has already built Azerbaijan's 230 MW Garadagh project, the largest solar power plant in the region, while ACWA Power is currently constructing a wind power plant with a capacity of 240 MW.

The news came as Masdar and SOCAR reached financial close for the 445 MW Bilasuvar and 315 MW Neftchala solar power projects in the country.

In preparation for the construction of more solar plants, the Cabinet of Ministers also announced that an area of state-owned land in the administrative territory of Azerbaijan's Fuzuli district has been defined as a territory for renewable energy sources. According to the Cabinet, 482 ha has been designated for the construction of a solar power plant with an installed capacity of 160 MW.

During his speech to delegates at the Energy Transition Investment Forum for Central Asia within the framework of COP29, Fagan Abdurrahmanov, Department Head at the Azerbaijan Renewable Energy Agency (AREA), said the country is planning to invest $2.8 billion for the construction of eight major solar and wind energy stations amounting to 2 GW of capacity in Azerbaijan by 2027.

"Currently, 4500 hectares of land has already been designated as a renewable energy zone. This land has been incorporated into the modern mega-project, and this morning, financial terms were finalised with our partners. These special zones will play a crucial role in implementing large-scale energy projects and will strengthen Azerbaijan's determination to build a sustainable future."

In what could be another significant development, Azerbaijan's Ministry of Energy signed a MoU on energy storage with China Southern Power Grid International (Hong Kong) Co., Ltd. and Powerchina Huadong Engineering Corporation Limited.

The MoU delineates collaboration in domains including pumped hydropower storage systems (PHS), battery energy storage systems (BESS), high-voltage direct current (HVDC) transmission systems, and further technologies for alternative energy transmission, distribution, and grid modernisation.

A steering committee and a working group will be formed to improve coordination and supervise the processes for effective implementation.

International community eyes Egypt clean energy sector

Several countries have inked agreements aimed at helping Egypt fulfil its clean energy ambitions.

Last month Voltalia and TAQA Arabia, inked a Memorandum of Understanding (MOU) with Egypt's Ministry of Electricity to repower the Zafarana wind farms. This partnership aims to revitalise the 545 MW wind farm which was originally commissioned by the Egyptian government two decades ago. Furthermore, this partnership will implement a 3 GW hybrid solution combining 1.1 GW of wind power and 2.1 GW of solar power.

The first commissioning of the project is expected in 2028. Additionally, technical and environmental studies for the project will be conducted to measure wind speeds, solar irradiation, bird migration, and site conditions. Furthermore, this initiative aligns with Egypt's national goals to enhance renewable energy capacity and increase private sector participation in the sector.

The news came as the State Duma, Russia's lower House of Parliament, ratified a protocol dated November 19, 2015 for the agreement between the governments of Russia and Egypt on the provision of a state export loan by Moscow to Egypt for the construction of a nuclear power plant.

The document was signed in Moscow on July 1, 2024 and in Cairo on September 22, 2024.

"The total loan is $25 billion. This is 85 per cent of the cost of building the nuclear power plant itself," said Deputy Finance Minister Vladimir Kolychev.

Ratification of the protocol will facilitate the settlement of debt obligations to Russia, as well as the development of further economic and scientific-technical cooperation between the two countries on the peaceful use of nuclear energy, which fully meets the interests of Moscow, according to the conclusion of the State Duma Committee on International Affairs.

Meanwhile, *Al Arabiya Business* has reported that German energy firm 2G Energy is pursuing partnerships with five Egyptian companies to launch projects in green hydrogen, biogas, and combined heat and power (CHP) systems.

Masdar explores renewable opportunities in BRI countries

Abu Dhabi Future Energy Company PJSC, better known as Masdar and China's Silk Road Fund (SRF) have signed a Memorandum of Understanding (MoU) to explore potential co-investment opportunities in renewable energy projects in Belt and Road Initiative (BRI) countries, primarily in the developing world and global south.

Under the MoU, Masdar and SRF will establish a strategic partnership to pursue co-investment opportunities in renewable energy projects developed, invested in or operated by Masdar. Silk Road Fund plans to invest up to RMB 20 billion ($2.8 billion) in projects alongside Masdar.

Masdar has significant investments in the Middle East, Central Asia, Southeast Asia and Africa, many of which are participants in the BRI. The company will continue to invest in these regions as part of its strategy to reach 100 GW renewable energy capacity by 2030.

SRF's renewable power portfolio totals more than 7 GW in Belt and Road regions, including the Middle East, Africa, Southeast Asia and Latin America. SRF honours its sustainability philosophy by working with strategic and financial partners to help realise the United Nation's vision of sustainable development.

Commenting on the MoU, Masdar's Chief Executive Officer, Mohamed Jameel Al Ramahi said: "This collaboration between two companies with significant investments in renewable energy projects in emerging markets and the global south will provide a major impetus to efforts to advance the energy transition.

The collaboration was one of several clean energy deals announced by Masdar around the COP29 climate summit.

Last month it signed a joint venture term sheet agreement with Korporata Elektroenergjitike Shqiptare (KESH) – Albania Power Corporation – to explore the development of gigawatt-scale renewable projects in Albania.

The joint venture term sheet agreement aims to develop, construct, and operate renewable energy projects utilising a range of renewable technologies, including solar PV, wind, and hybrid solutions, with potential integration of battery storage. The energy produced is expected to be supplied to the Albanian market and exported to neighbouring countries.

Al Ramahi commented: "As Masdar targets 100 GW by 2030, this joint venture with our partner KESH exemplifies the scale and ambition needed to advance the global energy transition and we look forward to further collaborations in Albania and the Eastern Balkans."

In mid-November, Masdar also signed an agreement with the Ministry of Energy Uzbekistan to develop a 1 GW wind farm in the Mingbulak region of the country.

UK and US join forces to accelerate nuclear technology for industry

In a bet on the need for nuclear for a low-carbon energy future, the UK and US have signed a major agreement to accelerate the development of advanced nuclear technologies for decarbonising energy-intensive industries such as jet fuel production, hydrogen production and advanced steelmaking by 2030.

The new framework agreement will allow the Generation IV International Forum (GIF), which excludes current participation from Russia, to continue after the current agreement expires in February 2025.

This collaboration aims to generate billions of pounds of combined research and development funding, bringing together leading academic institutions and industrial innovators from both nations.

The forum's work has identified six reactor technologies for development: the gas-cooled fast reactor, the lead-cooled fast reactor, the molten salt reactor, the sodium-cooled fast reactor, the supercritical-water-cooled reactor and the very high-temperature reactor.

The UK will play a prominent role in the GIF, facilitating information exchange and ensuring that these innovative nuclear technologies are available for industrial applications by 2030.

Ed Miliband, UK Energy Secretary, said: "Nuclear will play a vital role in our clean energy future. That is why we are working closely with our allies to unleash the potential of cutting-edge nuclear technology. Advanced nuclear technology will help decarbonise industry by providing low-carbon heat and power, supporting new jobs and investment here in the UK."

This joint effort aligns with the global commitment made at COP28 to triple nuclear power capacity by 2050, a goal supported by 31 countries, including the US and the UK.

The UK is actively pursuing its advanced nuclear reactor programme – launching a competition for small modular reactors (SMRs) through Great British Nuclear and continuing the development of the 3.2 GW Sizewell C nuclear plant.

The USA and the UK were the first two members to sign the new Framework Agreement. Once a third country signs it, the framework agreement will officially come into force on March 1, 2025. Other members then have three years to take the treaty through their national decision-making bodies if they wish to continue to participate in GIF activities. In total, 11 current GIF members are said to be likely to sign the new framework agreement, including Canada, China, France, Japan, South Korea, South Africa, Euratom and Switzerland.

Siemens Energy exceeds expectations as wind business recovery begins

- German group upgrades targets as Gas Services and Grid Technologies show strong growth
- Wind business begins recovery, as US rival halts search for offshore wind orders

Junior Isles

Siemens Energy has successfully completed its 2024 fiscal year, meeting or exceeding all its financial targets. The German energy technology group reported an annual profit of more than €1 billion and upgraded its medium-term targets as it began to recover from a crisis in its wind turbine unit.

Driven especially by strong growth in the Grid Technologies and Gas Services business areas, orders reached €50.2 billion, revenue came in at €34.5 billion, leading to a profit before special items of €345 million (profit margin before special items: 1 per cent). Siemens Energy's net income was €1.335 billion. All of the company's business areas showed good progress in the 2024 fiscal year. The strong order backlog (€123 billion) "builds the base for strong growth and rising profitability in the coming years", it said.

Siemens Energy also unveiled new mid-term financial targets for the 2028 fiscal year that will "set the course for the company's profitable growth trajectory" over the coming years. The company expects to achieve a compound annual revenue growth on a comparable basis in a high single-digit to low double-digit percentage range until fiscal year 2028. For the profit margin in fiscal year 2028, the company strives to reach a range between 10 per cent to 12 per cent.

Notably, the company said its wind business, Siemens Gamesa, is progressing in its revival as expected, continuing its turnaround in 2024. The integration and restructuring of the business has continued and it is committed to break-even in fiscal year 2026. Sales activities for the 4.X onshore wind turbine platform have restarted at the end of the fiscal year with low volume. The ramp-up of the offshore business continued in the fiscal year. For example, from the first half of the year to the second half, the output at the Cuxhaven site has roughly doubled.

The results paint a vastly improved picture compared to the beginning of the fiscal year, which started with an agreement between Siemens Energy and the German government for counter-guarantees to secure the growing order backlog and growth of the company. Siemens Energy intends to exit the federal counter-guarantees as soon as possible as these are subject to considerable additional fees.

While Chief Executive Christian Bruch declined to say that Siemens Energy had put the wind turbine crisis behind it, he said the company had discovered no new technical faults in its turbines and had "achieved everything we wanted to in 2024". However, he cautioned that the company was "not through yet in terms of working off the quality matters" and stressed that it was aware that "this will remain a lot of hard work".

The wind turbine division reported a €472 million loss, an improvement on the previous year's €670 million loss. The company said the figure partly reflected higher project costs "due to the known quality issues".

Meanwhile US rival GE Vernova, the world's third-largest wind turbine manufacturer by market share outside of China, said it will suspend its search for new offshore wind turbine orders until market conditions improve.

Chief Executive, Scott Strazik told the *Financial Times* last month that he wants a better economic environment following a difficult period for the offshore wind industry, which has struggled with supply chain strains and rising interest rates.

Strazik hopes over the next two years "the market will create economic incentives and opportunities for us to do business that [are] drastically different in economic terms than the economics we're executing on today.

"If that presents itself, we're going to work hard to serve that market. But it's not a market opportunity that we see in front of us right now."

He said the company's offshore wind turbine unit had a $3 billion backlog of orders that would take about two years to complete. It has not added to the backlog for almost three years.

European companies refocus renewables strategies as Trump effect hits renewables stocks

Shares in renewable energy companies slumped last month over fears that the re-election of Donald Trump will put the brakes on the sector. The fall in share prices came as several European energy companies moved to adjust their renewables strategies.

In early November Spanish utility Iberdrola fell more than 4 per cent, while Portugal's EDP Renewables fell almost 11 per cent. Most notably, Danish clean energy developer Ørsted saw a 14 per cent loss in share price, even as it reported what it called "solid" earnings for the first nine months of the year.

Mads Nipper, Group President and CEO of Ørsted, said: "I am pleased with our operational performance and financials results. Based on solid 9-month earnings, we have narrowed our EBITDA guidance for the year… Based on solid 9M earnings, we have narrowed our full-year EBITDA guidance from DKK 23-26 billion ($3.25-3.7 billion) to DKK 24-26 billion, excluding earnings from new partnerships and impact from cancellation fees."

Trump has pledged to end offshore wind in the US on "day one" and stop handing out subsidies under President Joe Biden's Inflation Reduction Act designed to boost renewables across the US.

Nipper, however, remained confident of the US clean energy sector. He highlighted the renewable industry's strong economic logic, ranging from demand for "green" power to robust job creation in Republican states.

"We are convinced that no matter what happens [in the election] there will be a strong role for renewables, both onshore and offshore at least in parts of the country," he said.

Several analysts also point to the growth in renewables during Trump's first presidency and agree the economic benefits of the IRA in Republican states are likely to give it some protection.

Opinion, however, is divided. Following the US election result Rob West, Analyst and Chief Executive at Thunder Said Energy, a research consultancy, said in a note: "Momentum behind many energy transition themes has been slowing in 2024. It is now harder to see a re-acceleration."

German utility RWE announced that it was scaling back its spend on renewables. The company intends to reduce its net investments in green projects to €7 billion in 2025-26, down from €10 billion in 2024. Instead, the utility said it would repurchase up to €1.5 billion of shares over a period of 18 months.

It said in a statement: "Given the results of the US elections, the risks for offshore wind projects have increased." The company also pointed to delays to European and UK ambitions to increase production of green hydrogen as a reason for revising its plans.

Chief Financial Officer Michael Müller said the reductions may cause RWE's plans to invest €55 billion in renewables by 2030, first announced last year, to "slip back".

The move appears to be part of a trend that is seeing utilities become far more targeted on where and what renewable investments they make.

Norwegian state-owned power company Statkraft AS said last month that it intends to divest its renewable energy businesses across several countries to keep a tighter focus on the Nordics, Europe and South America.

The plan will see Statkraft pull out of the onshore wind, solar and battery businesses in the Netherlands and Croatia, and over time, divest its hydropower and solar assets in India. In India, further sustainable growth would require significant investments, so Statkraft will be redirecting new investments to South America, Statkraft CEO Birgitte Ringstad Vartdal said.

In June the company announced a "sharpened strategy" which not only promised selective divestments but also scaled back targets for solar, onshore and offshore wind, battery storage and green hydrogen.

Meanwhile, Spanish utility Endesa SA announced a plan last month to revamp its renewable energy generation mix in the next three years, by cutting investments in solar power in favour of onshore wind, hydro and battery storage.

The aim is to reduce exposure to the solar business and focus on higher value-added assets, Endesa said during its Capital Markets Day, as it presented its 2025-2027 strategic plan.

MHI reports rise in order intake driven by strong GT demand

Japanese engineering conglomerate Mitsubishi Heavy Industries, Ltd. (MHI) has announced that order intake rose 7.9 per cent year-on-year (YoY) to ¥3383.5 billion ($22.5 billion) in the half-year ended September 30, 2024.

In energy, order intake increased by ¥225.6 billion YoY, as gas turbine combined cycle (GTCC) and aero-derivative engines continued to see strong demand. Contracts for nine large frame gas turbine units were concluded in the first half, with the largest YoY growth seen in the Americas. Revenue increased by ¥71.2 billion YoY mainly from large volume in aero nngines and steady project execution in GTCC and nuclear power.

MHI revised its guidance for the period ending March 31, 2025, increasing the target for order intake by ¥200 billion over the previous announcement made August 6, 2024. This was in response to steady progress mainly in energy.

Global energy giants commit to green investments at COP29

Leading energy companies TotalEnergies, BP, Shell, and Equinor announced a joint investment commitment of $500 million to accelerate the development of sustainable renewable and alternative energy sources during COP29 in Baku, Azerbaijan. The funding aims to support a range of initiatives, including renewable energy infrastructure and innovative clean energy technologies.

In addition to their joint commitment, the companies, along with Chevron, ExxonMobil, and Eni, revealed plans to expand their biofuel strategies as part of their broader energy transition efforts. The group outlined a roadmap of over 40 biofuel projects set to be implemented by 2030.

The announcement came as Shell reported an 8 per cent group-wide decrease in renewables and energy solutions in the third quarter, down from 10 per cent across 2023 and 15 per cent across 2022. This did not include Shell's investments in areas such as biofuels and electric vehicle charging, the company said.

Americas

DOE awards $2.3 billion nuclear asset contract

The US Department of Energy (DOE) has awarded a 10-year contract to a consortium of AtkinsRéalis Group, Westinghouse Government Services and Jacobs Technology to operate the depleted uranium hexafluoride (DUF_6) conversion facilities and assume site landlord responsibilities at the Paducah and Portsmouth Gaseous Diffusion Plants.

Under the terms of the contract, the joint venture known as Mission Conversion Services Alliance (MCSA) will operate the DUF_6 conversion facilities, transforming the inventory of DUF_6 into a more stable uranium oxide (OUx) for disposition. MCSA will provide surveillance and maintenance services of the DUF_6 cylinder inventory awaiting disposition and perform off-site disposal of empty cylinders as well as the depleted uranium oxide. MCSA will also provide protective security forces, emergency management and fire protection services as well as operating and maintaining utilities at both plants.

AFRY to modernise Peru hydropower plants

AFRY has been chosen by Electroperú to supervise the modernisation and life extension of the 798 MW Santiago Antúnez de Mayolo and the 210 MW Restitución cascade hydropower plants in Peru.

AFRY will modernise and replace systems and equipment at the two power plants to ensure operational continuity and enhance reliability. The estimated value of the order is $2.75 million. The two power plants form the Mantaro Hydroelectric Complex.

The project includes the procurement of goods and services for replacement and modernisation, as well as the implementation of training and education programmes to ensure the reliability and safety of operations.

Nordex units for Canadian wind farm

Nordex will supply 19 N163/5.X turbines to a Canadian wind farm developer and operator for a wind farm in the province of Québec.

Nordex will supply the N163/5.X turbines on 125 m high tubular steel towers in summer 2026. The customer has ordered the turbines in the cold climate variant and Nordex will equip them with the Nordex Advanced Anti-icing System for rotor blades.

The customer's name and the name of the wind farm are undisclosed.

Tampa Electric orders gensets from Wärtsilä

Tampa Electric has contracted Wärtsilä to supply generating sets and auxiliary equipment for its new generating facility in Florida, USA. The 72 MW MacDill Power Station will operate with four Wärtsilä 50SG engines running on natural gas. The first phase, consisting of two units is scheduled to be operating by the end of 2024, and commissioning of Phase 2 is scheduled for H2 2025.

Under normal conditions, this plant will generate power for the company's customers throughout the service territory. Under special conditions, the plant will have the capability to operate in island mode to provide a reliable and resilient source of electricity for a military base.

Asia-Pacific

Energy China to build 3.5 GW solar plant

China Energy Engineering Group (Energy China) has won the engineering, procurement and construction (EPC) contract for the Terra Solar Project in the Philippines. The project will have a capacity of 3.5 GW and a 4.5 GWh battery energy storage system.

Under the terms of the agreement signed with Terra Solar Philippines Inc (TSPI), Energy China will handle the turnkey delivery of key components for the project. Energy China will be in charge of procurement, design, engineering, permitting, manufacturing, testing, logistics, and on-site delivery. It will also provide warranty coverage and develop training programmes.

The Terra Solar project will be located on the island of Luzon, about 100 km from Manila.

Subsea cables for Korea offshore wind farm

Singapore's Vena Energy has chosen LS Cable & Systems of Korea as the preferred submarine cable supplier for the 504 MW Taean Offshore Wind Farm off the coast of South Korea's South Chungcheong Province.

LS Cable has signed an agreement with Vena's local subsidiary Taean Wind Power under which LS Cable will supply high voltage subsea cables and be in charge of the engineering, manufacture, delivery, and installation of the cables.

The Taean project will be located around 30 km off the coast, and is scheduled to break ground in late 2026, with operations due to start by late 2029..

GE Vernova to supply H_2-capable GTs

YTL Power International's wholly-owned subsidiary, YTL PowerSeraya, has placed an order for a GE Vernova 9HA.01 gas turbine to power a new hydrogen-capable 600 MW gas turbine combined cycle power plant to be built in Pulau Seraya Power Station (PSPS) on Jurong Island, Singapore.

The plant is expected to be GE Vernova's first hydrogen-blended natural gas fueled facility in Singapore. The contract also includes an STF-A650 steam turbine, a W88 generator, and a triple pressure with reheat HRSG. The plant is scheduled to start operation in 2027.

The 9HA.01 gas turbine will initially run on natural gas, but is capable of burning up to 50 per cent of hydrogen blended with natural gas, with a technology pathway to 100 per cent hydrogen.

Indian wind turbine orders for Sany

Sany Renewable Energy has won orders totalling 1.6 GW of wind turbines from two customers in India.

Sany said it has recently signed wind turbine sales contracts for a total of 1324 MW with three subsidiaries of Indian conglomerate JSW Group. In addition, a 300 MW deal has been signed with the Indian subsidiary of Sembcorp Ltd.

Andritz to uprate Malaysian hydro plant

Andritz has won a contract from TNB Power Generation to carry out a major uprating of the Chenderoh hydropower plant in Malaysia. The uprating plan is to extend the plant's operational lifespan and increase the capacity of the three units by 5 per cent.

Andritz will carry out major uprating works on the turbines and will supply new generators and rehabilitate the hydromechanical equipment of the generating units. It will also improve the safety and reliability of auxiliary systems, the Unit 4 cooling system, and support systems. New equipment, including a generator transformer and a powerhouse crane, will be installed.

The rehabilitation of Chenderoh is part of TNB's broader Life Extension Programme for its plants.

Europe

Hitachi Energy to boost Sweden grid capacity

Hitachi Energy and Kanonaden Entreprenad Mälardalen have won a $300 million order from Svenska kraftnät to increase the capacity of existing transmission lines and increase the country's renewable energy consumption from hydro and wind resources in North Sweden.

Hitachi Energy will install up to ten series compensation systems, expected to be operational by 2030. These will increase the transmitted power by up to 50 per cent through new and existing power lines.

Niklas Persson, Managing Director of Hitachi Energy's Business Unit Grid Integration, said: "Our compensation systems will reliably transfer renewable power from northern generation sources to the southern urban areas. This will mitigate one of the Swedish grid's main challenges of transmission line losses by increasing system efficiency and ensuring a seamless delivery of renewable power to high-consumption centres."

Hitachi Energy secures East Anglia II contract

ScottishPower Renewables has awarded a contract to Hitachi Energy to enable the integration of 960 MW from the £4 billion East Anglia TWO wind farm, located 32 km off the Suffolk coast of England.

Hitachi Energy will provide GrideXpand Offshore solutions and onshore grid connection equipment using an EconiQ gas-insulated switchgear.

Ukraine to build 800 MW of wind power

Herman Halushchenko, Ukraine's Minister of Energy, said that the key focus for renewable energy sources in Ukraine in 2025 will be the development of wind energy.

Halushchenko said: "In terms of green energy, we definitely intend to significantly increase wind generation next year. There are plans to build specific wind power facilities with a capacity of over 800 MW." He added that there was considerable interest in wind energy from Ukraine's Western partners. He said: "We discussed this with our Norwegian colleagues, who are considering a large project in Ukraine for 300 MW, specifically related to wind energy."

Sargent & Lundy to expand Cernavoda

A joint venture consisting of Ansaldo Nucleare, Candu Energy (AtkinsRéalis), Fluor, and Sargent & Lundy, has won an engineering, procurement and construction (EPC) contract and construction management contract from EnergoNuclear for the construction of Units 3 and 4 at the Cernavoda Nuclear Power Plant in Romania.

Under the Limited Notice to Proceed (LNTP), the joint venture will provide critical information for a final investment decision, including the development of engineering and construction plans, an updated cost estimate, and preliminary nuclear safety assessment reports and engineering documentation.

International

GE Vernova wins 100 per cent H2 GT order

GE Vernova has won an order for an LM6000 gas turbine that will operate on 100 per cent hydrogen at the Whyalla hydrogen power plant in the Upper Spencer Gulf, South Australia.

The order was with ATCO Australia and BOC for four LM-6000VELOX units, scheduled for commissioning in early 2026. This is GE Vernova's first order for a commercial scale aeroderivative gas turbine capable of operating on 100 per cent hydrogen.

The 200 MW peaking power station is part of a larger hydrogen project that will include a 250 MW electrolyser and a 100 ton hydrogen facility. The company said: "When completed, the Whyalla hydrogen facility will utilise South Australia's surplus renewable energy, generated by large-scale wind and solar farms, to produce renewable hydrogen that will be stored and used to power the four LM6000VELOX units."

Qatar contract for 2.4 GW gas fired plant

Four firms from Japan and South Korea – Sumitomo, Shikoku Electric Power, Korea Southern Power, and Korea Overseas Infrastructure and Development Corp. – have jointly won a contract to build and operate a natural gas-fired power plant and a seawater desalination facility near Doha in Qatar.

The project involves the construction and operation of a 2.4 GW natural gas fired power plant and a 495 000 tons/day seawater desalination facility on the site of an old power plant located approximately 25 km south of Doha.

Kahramaa Sumitomo, representing the four companies, signed a long-term power and water sale agreement with Kahramaa.

Two CCGT plants for Saudi Arabia

A consortium of TAQA, JERA, and Al Bawani Capital have agreed two 25-year PPAs with Saudi Power Procurement Capital (SPPC) on a BOO basis to develop two new greenfield combined cycle gas turbine (CCGT) power projects with a total combined capacity of 3.6 GW in Saudi Arabia.

The two plants, the 1.8 GW Rumah 2 and the 1.8 GW Al Nairyah 2 power plants, are independent power producer (IPP) projects to be built by a consortium comprising of TAQA, JERA and Al Bawani.

The two new plants will be developed by respective special purpose entities owned by TAQA (49 per cent), JERA (31 per cent) and Al Bawani (20 per cent) with O&M to be undertaken by the partners through respective O&M special purpose entities with the same shareholding structure.

The Rumah 2 IPP and Al Nairyah 2 IPP will use the highest efficiency CCGT turbines available and will enable the utilisation of carbon capture technologies.

Ormat wins New Zealand geothermal contract

Ormat Technologies has won a $200 million EPC contract from Contact Energy to develop the 101 MW Te Mihi Stage 2 geothermal power plant in New Zealand. The plant is scheduled to be completed by mid-2027.

Gas: still a key role to play in the green transition

The new Komotini combined cycle power plant is part of Greece's plan to withdraw from coal fired generation
Photo: courtesy TERNA S.A.

Some argue that the days for gas fired power generation are numbered. **Junior Isles** hears from Siemens Energy's Executive Board Member, Karim Amin, why this is far from the truth.

While the future of electricity generation is renewables, any prediction that it means the imminent end of fossil fired generation, and gas in particular, is premature. The growth of wind and solar has been exponential and indeed needs to continue at an even faster pace if the world is to meet its climate targets. But according to the International Energy Agency (IEA), demand for gas will continue to grow.

In its recent World Energy Outlook (WEO 2024), the Paris-based agency revised upward its forecast compared with WEO 2023. The report says the revision reflects "stronger anticipated demand for gas to meet growth in electricity demand in China as well as additional demand in the Middle East, where policies to shift away from oil in electricity generation have been reaffirmed". The IEA largely attributes the upward trajectory to the accelerating deployment of renewables, efficiency gains and the electrification of end-uses.

It is an outlook echoed by Siemens Energy. Commenting on the role of gas going forward Karim Amin, who is a Member of the Executive Board and leads the Gas Services Business Area at the manufacturing giant, said: "During the last year and a half, we've started to see a stronger realisation of the role of gas as part of the solution in facilitating the energy transition rather than being itself part of the problem.

"We've seen an increased role for gas. In 2024 there have been more than 120 large gas turbines sold in the market, amounting to about 60 GW. So, there is clear indication and proof points that there is a strong demand for natural gas."

According to Siemens Energy, there are a few key reasons for this demand. Firstly, gas is a very strong enabler for renewables. Amin notes that for every 3-4 GW of renewables, operators need to also add 1 GW of gas as dispatchable power to ensure security of supply.

"With COP28 calling for a trebling of renewables by the end of the decade, there's strong demand for gas – either for peaking applications or for mid-merit operation to handle intermittency," said Amin.

Amin has seen an increased role for gas

In the mid-term, i.e. out to 2029-30, Siemens Energy forecasts the market for large gas turbines will be around 65-70 GW annually.

Amin sees a growing population, electrification of industry and data centres and the growth of artificial intelligence (AI) as key drivers of global energy demand.

"From our discussions, we see that by 2030, the energy demand of data centres will be equal to 4 per cent of global electricity demand," he noted. "There we also see demand for medium-sized gas turbines. The demand coming from generative AI is huge and the data centre infrastructure is growing exponentially. The semiconductor bottleneck is not the central challenge [to this growth] anymore; the number one question for every data centre operator right now is how to get the electricity they need – how to get it fast and how to decarbonise that generating capacity. And this would add more demand on top of the 65-70 GW per annum."

In light of the energy crisis in Europe, where electricity prices have skyrocketed as a result of gas price volatility, some have questioned the viability of gas as a power generating source going forward. Further, the security of gas supply and the potential impact on the security of electricity supply, has also come under the spotlight with Russia's invasion of Ukraine.

As Europe attempts to wean itself off pipeline gas from Russia, other players have stepped in to not only fill the void but also to meet increasing global demand. Azerbaijan expects to increase LNG exports to the EU, and the US has also struck deals to help meet European demand.

"If you look at the shale gas coming from the US and LNG from Latin America, I think we will see increased supply of natural gas. Recently, there have also been huge finds in Saudi Arabia and Qatar, and they will continue to drive their energy agenda to supply the world with the energy it needs. Prices are therefore expected to remain competitive."

Amin argues that for Europe to achieve its sustainability targets while maintaining affordable, secure electricity, it will need to look to gas and nuclear as complementary solutions.

"We will see what we call a nuclear renaissance. There is a lot of discussion around building new nuclear capacity or extending existing nuclear capacity. But this takes time and the exponential need for electricity will not wait," said Amin. "We will have to see what the new administration in the US brings, but we expect there will be a lot of focus on reducing the cost of electricity and this will support the affordability of gas fired power plants."

The other main driver for gas is decarbonisation. According to Amin, "the coal-to-gas switch is also a strong driver", noting that switching from coal to gas can reduce CO_2 emissions by as much as 60 per cent. With coal still accounting for 35 per cent of electricity generated globally, there is plenty of scope for cutting emissions through switching.

"Germany alone has about 30 GW of coal [fired generation] and ambitious phase-out plans for the upcoming years," said Amin. "But we also see a clear shift [from coal to gas] in Eastern Europe and the US. If we look at the US; in the period from 2005 to 2020, the US managed to achieve a total reduction of 850 million t of CO_2 – 500 million t of this came from the coal-to-gas shift, while 250 million t came from the addition of renewable capacity. So, the biggest cut came from coal-to-gas."

The US is one of the largest markets where this has been happening, but it is also a trend in Eastern Europe, where there have been many projects in countries like Poland, Romania and Czech Republic, which have been focusing on replacing coal capacity with gas fired generation.

Amin noted: "We hope that we will soon be able to see a reliable timetable for the transition to efficient and H_2-ready gas fired power plants in Germany and other industrial countries. We have seen a strong demand for gas in the last 12 months. Siemens Energy has sold 32 large gas turbines globally, for example European countries like Poland, Greece and Romania are looking to move away from coal, introduce more renewable energy and back this up with dispatchable power. This fits into the EU's plan for decarbonisation."

Amin also expects to see this coal-to-gas shift in China. He added: "China and other parts of Asia such as Indonesia, Philippines, Vietnam and India – countries where you have a very strong coal backbone – will definitely follow, but beyond 2040. There is still a long way to go in getting coal completely out of the system, and certainly replacing it with more renewables backed by dispatchable power, which in our view will be a mixture of gas and energy storage."

According to its calculations, Siemens Energy says that in the last year it has sold gas turbines – mainly focused on coal-to-gas – that will result in the avoidance of about 500 million t of CO_2 emissions over the typical 20-year lifetime of the plants installed.

Despite the clear benefits of gas in terms of it being far cleaner than coal, there are those who argue that instead of locking in any emissions for 20-30 years – albeit a reduced amount – all fossil fuels should be left in the ground. It's not an argument that Amin believes holds water.

"We have been hearing this narrative for the last six or seven years and it has become very clear that renewables are the technology that the world needs to follow in order to decarbonise and have the least impact on the environment. There's no doubt around this. But it has also become very evident that you cannot run most countries' electricity systems solely on renewable energy because of its intermittence."

He pointed to the UK as one example, noting that in one day there can be a swing of up to 17 GW in power drop-off when the wind is not blowing.

"When this happens, and parts of Europe are not very favourable for solar, where do you get the electricity from? This has made it very clear that you need dispatchable power and if it's not available through long duration storage, which we still do not have, then the solution we have is gas," explained Amin.

Expanding on the storage discussion he said: "Batteries are not suited for long term energy storage – they are only suited for a few hours. If the electricity demand is less than 3-4 hours, then battery storage technology would definitely be a viable solution to consider. However, we don't have the scale yet; also, we don't have the technology today to take care of longer durations. Technologies like compressed air and others are still in their infancy when we talk about the scale, we need nationwide.

"If battery storage or any form of storage was available, reliable, and scalable, the industry would have chosen it. There is a reason why we don't see it at this point. I don't believe that for long term storage, we have the scale and maturity yet that is needed to support a critical infrastructure such as energy."

He added: "We will see exponential growth in batteries, but the world is also seeing a lot of pressure on the raw materials needed for batteries, which are also needed for electric vehicles. So, there is a lot of competition [for raw materials]."

If gas use is unavoidable this then begs the question: how do you decarbonise it to avoid locking in future emissions? Amin questioned the argument that constructing a gas fired plant today means the world is locked into its emissions for its lifetime.

"If you build a gas fired plant, does that really mean you are locked-in to emissions for 25 years? I would say the answer is no. You don't need to run it baseload; you only need to run it when you need it. This provides the affordability and security of supply the system needs as much as it needs sustainability. Operating hours are about 20 per cent of what it used to be before. So, if you used to run a baseload gas turbine for 8000 hours [per year] it would now be less than 2000 hours."

He also pointed to ongoing work to decarbonise gas turbines by converting them to run on green hydrogen, i.e. hydrogen produced through electrolysis of water using electricity generated from wind or solar.

He said: "Gas turbines also have a path to decarbonise, even by blending it with clean hydrogen. Obviously, you always need to look at the feasibility of doing that, and how much it will cost, etc., but it's a path. And some countries, like Germany, are clearly following this path."

Siemens Energy has been making progress in adapting its portfolio of gas turbines and has demonstrated 100 per cent hydrogen firing on its SGT-400 machine. In 2022, an initial series of tests enabled the industrial

A Siemens Energy SGT-9000HL gas turbine on its way to Saudi Arabia, where highly efficient gas fired power plants in combination with CO_2 capture and storage are part of its net zero strategy

gas turbine to operate with a 30 per cent hydrogen content, mixed with natural gas. Then in October 2023 a power-to-hydrogen-to-power demonstration project in France, known as HYFLEXPOWER proved that state-of-the-art turbines with dry low emissions technology can be fuelled with up to 100 per cent hydrogen as well as with natural gas and any blends in between.

The knowledge and experience gained from the project will help the company to continue developing its entire gas turbine fleet for a hydrogen-based future. The interaction between electrolysis, storage, and hydrogen conversion at one site has been demonstrated, and now, says Siemens Energy, it is a matter of scaling the results.

The plan is to extend this capability to its large units with the expectation that 100 per cent H_2 gas turbines will be commercially available in all turbine size ranges by 2030.

Amin commented: "We have a roadmap, including our large gas turbines, to get to 100 per cent hydrogen-firing. Some months ago, we ran a test on an F-class machine on 15 per cent hydrogen and we are planning to go to 30 per cent after the winter peak. We are also running testing campaigns in our facilities in Germany for our large, advanced HL machines."

The challenge of moving from an average of 15 per cent today to 100 per cent in just five years, says Amin, is not in burning pure hydrogen. "The complexity," he said, "is in developing a combustion system that is capable and is optimised to work with these dual fuels. When it burns natural gas, it needs to be able to do so efficiently; when it burns hydrogen it needs to be capable of doing that efficiently and when both are mixed, they also need to be burned efficiently. So basically, you are trying to optimise three combustion modes. If it was a case of developing a combustion system able to burn 100 per cent hydrogen alone, we could go even faster."

Carbon capture and storage/utilisation offers another route to decarbonising gas fired plants. High cost, however, has resulted in negligible uptake among power plant operators globally. Nevertheless, the need for urgent climate action has seen a push from a handful of governments.

For example, in October the UK government announced a £22 billion investment, spread over 25 years, in carbon capture and storage projects, focusing on developing two carbon capture clusters in Merseyside and Teesside to help the UK meet its climate objectives.The investment will be split between three projects, capturing carbon dioxide released either from making hydrogen, generating gas power or burning waste to create energy from 2028.

Meanwhile the US is expected to increase its carbon capture capacity seven-fold by 2035, supported by incentives from the Biden administration. The nation will have the capacity to capture as much as 164 million t of carbon by 2035 – almost equivalent to the next three markets combined – according to BloombergNEF. The clean energy research organisation said the global carbon capture sector attracted more than $11 billion in investments last year – nearly doubling from the 2022 level. The US share was 25 per cent.

In addition, some gas fired projects are being built with the ability to capture carbon at some stage in the future. For example, Saudi Arabia has a strategy to reach net zero by 2060 and is relying on modern, highly efficient gas fired power plants in combination with CO_2 capture and storage, to significantly reduce its emissions. In June this year Siemens Energy secured a contract to supply key power plant technologies to the Taiba 2 and Qassim 2 power plants, which will together provide almost 4 GW to the Kingdom.

The new plants will save up to 60 per cent of CO_2 compared with oil-fuelled power plants. They will also be compatible with the Kingdom's energy strategy, which calls for the construction of CO_2 capture and storage facilities in the medium term to enable a carbon-neutral energy supply.

Amin noted: "The customer is building the combined cycle plant today with provisions for carbon capture. So, we build the plant today because they need it but we also already consider space at the site, layout design, and auxiliary systems to accommodate the integration of a carbon capture plant at a later stage. This would remove around 90 per cent of the CO_2 emissions."

Amin is confident that progress in capture technology will drive penetration in the power sector. Asked whether costs must come down, or carbon prices have to rise in order to make CCS feasible, he said: "I think there are two elements. One is the feasibility – doing carbon capture costs money. There is capex cost, and performance [cost] – the chemical processes for CO_2 capture use energy. With regards to carbon price the question is whether there are enough incentives – whether through carbon credits or investment incentives to do it.

"But the second point is the technology. The conventional technology we have right now for carbon capture is very capex intensive. It almost doubles the capex you need to build a conventional combined cycle power plant. So, the cost is high and there is a lack of incentives."

Nevertheless, he sees two things that are changing – firstly governments are providing the much-needed incentives such as those provided in the US through its Inflation Reduction Act. And as the investment case becomes stronger, technology development is accelerating.

"There are technologies under development – technologies that are not ready for commercial release but under development. We refer to these as 'Generation II' carbon capture. They are moving away from the capex-heavy conventional technology to 'lighter [capex]' technology that makes much more use of centrifugal separators. This capex reduction, combined with incentives could make a case for carbon capture," said Amin.

Unlike conventional capture which uses solvents and chemical process to remove carbon dioxide, centrifugal separators use centrifugal force to separate the CO_2 in the flue gas from the other gases. Such installations will be much smaller and cheaper than their chemical-based counterparts.

Notably, in partnership with 8 Rivers Capital, a decarbonisation technology and property developer, Siemens Energy is developing a zero-emissions turbine that will generate 270 MW of electricity from captured CO_2. Since the end of 2023, 8 Rivers and Siemens Energy have been developing direct-fired supercritical CO_2 turbines across a range of applications and fuel types.

Amin notes, however, that although these new technologies will help penetration in the power sector, CCS deployment will also depend on geology as not all plants will be located close to sites suitable for sequestering CO_2. "It has to be in a place where it is possible to use the CO_2 or store it," said Amin "but we are starting to see projects be awarded."

In preparation for a future where the role of gas is increasing in the near- to mid-term but ultimately decrease, Amin believes the company's wide portfolio means it is well placed to enable the energy transition.

"We are very flexible in moving our resources between the gas business, our renewables wind power business or Grid Technologies business, which is growing exponentially as well – whether its engineering resources, project management or even repurposing some of our manufacturing facilities," he said. "But right now, what we see for 2030 and beyond is a very strong demand for new build. This year we saw our highest number of orders for gas turbines in a decade."

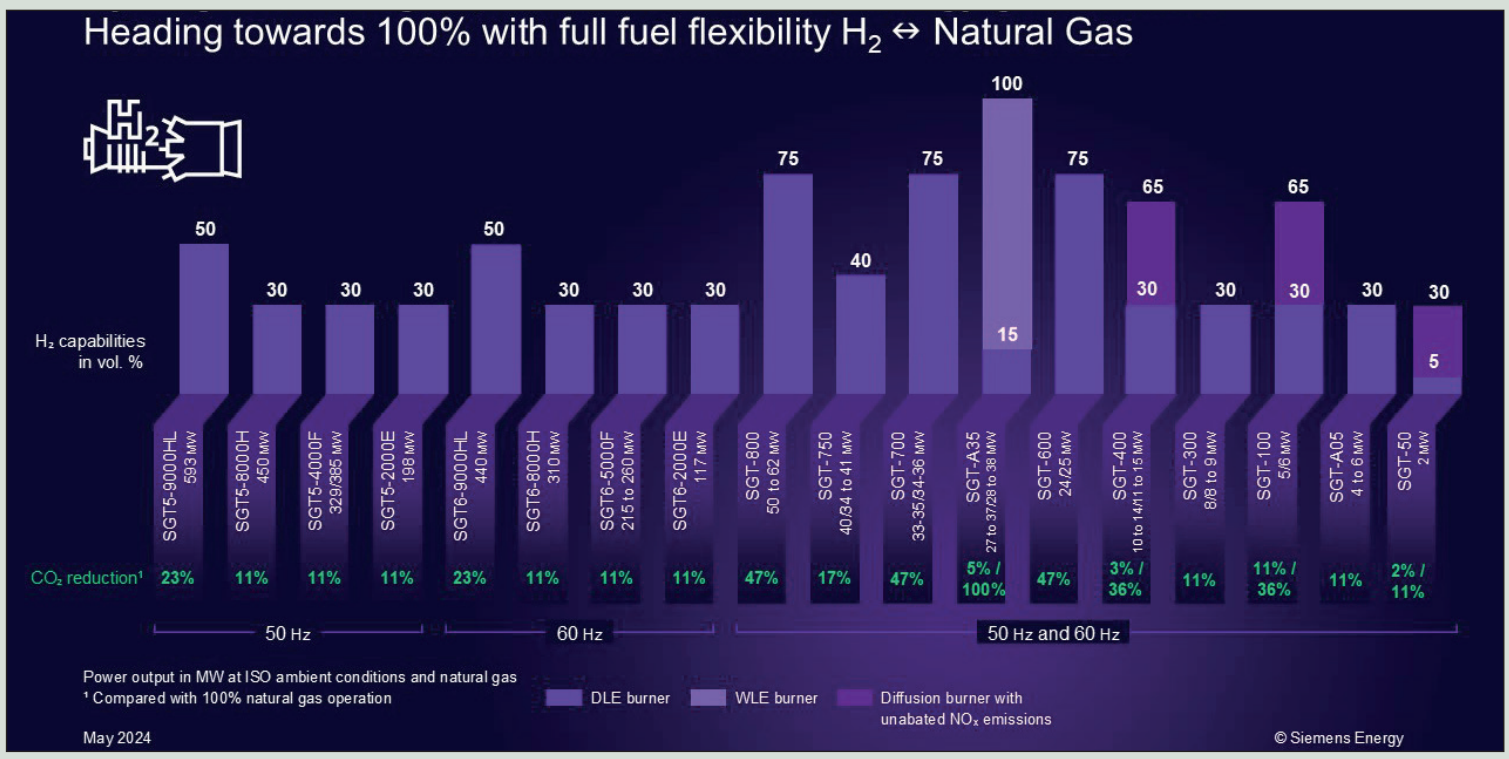
In its financials released last month, Siemens Energy's Gas Services business reported a 28 per cent growth in orders, amounting to €16.4 billion, compared to last year. And projecting to 2028, the business is forecasting low- to mid-single digit revenue growth.

"We have reached a record backlog of €45 billion in our Gas Services business – mainly for servicing. This gives us very strong predictability and we expect to see more demand, driven by decarbonisation. This will create a good runway for revenue growth," Amin commented. Siemens Energy believes the market demand is robust. As Amin put it: "Energy demand is the backbone of any economic social or development."

With plant operators around the globe, apart from Europe, running gas plants for longer hours, the future looks bright for the company and the Gas Services business. So much so, that the company plans to expand its factor capacity for large gas turbines by 30 per cent.

"There is clear direction that the existing capacity is short of market demand, and we are responding to that," said Amin.

It is in some ways ironic that with the power sector moving rapidly towards total decarbonisation, largely through renewables, the use of gas, a fossil fuel, has become crucial to meeting clean energy growth. Not so long ago many did not expect gas to flourish in such a market.



Overview of Siemens Energy's gas turbine hydrogen co-firing capabilities

Hydrogen

Biden administration grants $2.2 billion to hydrogen hubs in Midwest and Gulf Coast

In the final days of his administration, US President Joe Biden has awarded $2.2 billion to two potential hydrogen production centres. But as Donald Trump prepares to return to the White House, questions abound as to hydrogen's future in the US.

Gary Lakes

The US Department of Energy (DOE) last month awarded grants worth $2.2 billion meant to fuel the development of two hydrogen hubs – one that will cover the states of Illinois, Indiana, Iowa and Michigan through the Midwest Alliance for Clean Hydrogen (MachH2) and for the Gulf Coast, the HyVelocity facility in Texas. The two projects are the fourth and fifth to receive federal funding following the ARCHES project in California, ARCH2 in West Virginia and the Pacific Northwest Hydrogen Hub in Washington, Oregon and Montana.

Both hubs have initially received $22 million from the DOE. The grants cover $1.2 billion for HyVelocity and MachH2 is to receive $1 billion.

A total of seven projects proposed for the production of hydrogen were selected by the DOE last year as part of the Regional Clean Hydrogen Hubs Program. Some $7 billion in financing is available to the projects under President Joe Biden's 2021 Bipartisan Infrastructure Law.

"The Biden-Harris Administration has followed through on its promise to kickstart a new domestic hydrogen industry that can produce fuel from almost any energy resource in virtually every part of the country and that can power heavy duty vehicles, heat homes, and fertilise crops," US Secretary of Energy Jennifer M. Granholm, said in a statement released by the DOE on November 20. "Today's announcement marks a major milestone in DOE's Hydrogen Hubs programme, signalling our deep commitment to strengthening America's energy security and boosting our economic and global competitiveness while also tackling the climate crisis," she added.

Both projects named last month include large-scale green and blue hydrogen projects. (Green hydrogen and ammonia are produced using renewable energies, blue hydrogen and ammonia are produced with energy produced from fossil fuels). MachH2 will also produce pink hydrogen by using nuclear power. Those projects using fossil fuels will include methods of carbon capture storage and utilisation. The Biden administration had set a target to produce 50 million t of clean hydrogen by 2050.

First phase development for the facilities, covering planning, design, and community engagement, is set to last 18 months. But as President-Elect Donald Trump will enter office on January 20, there are questions as to whether his administration will continue to support a hydrogen development programme. The facilities may not be able to proceed with a final investment decision unless they can access a $3/kg clean hydrogen tax credit that was included in the 2022 Inflation Reduction Act. The Trump administration – backed by a Republican Congress – can amend the act or overturn it.

Hydrogen's unique characteristics will allow the H2Hubs to substantially reduce harmful emissions from some of the most energy-intensive sectors of the economy, such as chemical and industrial processes and heavy-duty transportation, while creating new economic opportunities across the country, the DOE statement said. It could also be used as a form of long-duration energy storage to support the expansion of renewable power. By enabling the development of diverse, domestic energy pathways across multiple sectors of the economy, clean hydrogen will strengthen American energy independence and accelerate the American manufacturing boom, the DOE stated.

Most of the hydrogen produced currently – as much as 70 million tons annually – comes from fossil fuels, but hydrogen advocates argue the it could be used in the steel, cement, aluminium industries and for long-haul power generation. Research is being carried out for the use of hydrogen in home heating and as automotive fuel. A big part of making hydrogen a substitute for fossil fuel has to do with reducing the cost of producing it. Currently, the cost is around $7/kg, but to make it commercially viable, a price near $1.50/kg would launch major changes.

It has been calculated that green hydrogen made from the electrolysis of water will be fully cost competitive with fossil hydrogen when it costs less than $1.50/kg, according to the website Carbon Commentary, which reports that NEL, the world's largest electrolyser manufacturer has forecast a price of $1.50/kg will be possible by 2025, based on a price of $20/MWh for electricity. The website said that at the current efficiency level of about 67 per cent, the world will need 50 TWh for each million tons of green hydrogen. At the prospective efficiency level of about 75 per cent, this number falls to about 44 TWh, according to the website's calculations. A world that requires 500 million tons of hydrogen will therefore need to produce 22 000 TWh of green electricity a year just for this purpose. Today's global production from all wind and solar farms is a little more than 10 per cent of this figure. To meet the need for hydrogen we need a sharp acceleration in renewable installations to several terawatts a year, it said.

It seems like a daunting challenge, and while the Trump Team believes that "drill, baby, drill" is the answer to the world's energy problems and the climate crisis is a fallacy, it could wind up with the next US administration giving little attention to support for hydrogen.

Gas

LNG demand projected to peak in 2040 but new capacity is still required

Natural gas, and LNG in particular, have grown in importance as the world begins to transition away from coal. Demand for LNG has expanded and contracted in recent years due to economic and political factors, but LNG will continue in a vital role for the next decade and demand will nearly double before it peaks, according to a new report.

Gary Lakes

In global energy markets, LNG is viewed as the way to go in the future. Countries, especially developing economies, are switching to gas from coal in order to reduce their greenhouse gas emissions in line with international efforts to stop global warming and address climate change. During the course of its 60-year career, LNG has seen prices rise and fall, depending on all the factors that determine supply and demand, but in a new report on "the looming supply of LNG" by London-based Gas Strategies, the LNG market has grown to become "one of the most consequential energy markets in the world".

The world has another five years to go before reaching 2030 and between now and then LNG is expected to see a number of fluctuations in demand and supply, and prices as well. For example, in its 'Global LNG Outlook 2024-28' released in April this year, the Institute for Energy Economics and Financial Analysis (IEEFA) forecast "lacklustre demand growth and a massive wave of new export capacity" that would send LNG markets into over-supply within two years. The IEEFA acknowledged that the Russian invasion of Ukraine had caused a spike in European LNG imports that sent global prices to record highs but noted that prices have since fallen, primarily because of reduced demand from developed countries such as Japan, South Korea and Europe, the three of which account for more than half of global LNG demand.

According to the IEEFA, demand will continue falling for now and in the future alternative energies would encroach on demand for LNG. The Institute refers to a projection by the Paris-based International Energy Agency (IEA) that says total LNG trade in 2050 would reach 482 million tons per year under its stated policies scenario. IEEFA projects that total LNG production capacity by the end of 2028 will reach 666.5 million t/y which means that capacity of that size will exceed what the IEA has forecast for 2050.

In the report released last month, 'How LNG supply will form in a market of peak LNG', Gas Strategies says that LNG demand will grow by some 345 million tons by 2040, to 745 million tons. LNG has come to play a crucial role that the gas analysis firm says will continue.

During 2023, a little over 400 million tons was traded and currently some 218 million tons have undergone a final investment decision (FID) and will come online in the next few years. But a supply gap will open with the start of 2030, caused in part by a production decline brought about by a decline in aging gas fields that are feeding older facilities such as some in Australia, Indonesia and Algeria. This will create a need for new capacity by 2040 of around 220 million t/y on top of the capacity that is currently under construction, Gas Strategies said.

The situation will require FID for 20 million t/y annually until the mid-2030s, the report says. And this will be done within the context of 'peak LNG' in the market.

"Going forward, the sanctioning of new large-scale plants will depend on a continuation of an investment climate favourable to LNG, including the availability of finance for fossil fuel investments and a willingness of buyers to conclude long-term contracts," the report says.

There are a number of challenges that a facility planned to come online in the mid-2030s would face, the report suggests. There could be a fall in the number of long-term off-takers; producers could face strong competition as demand for LNG dissipates (to around 580 million t/y in 2050, according to Gas Strategies); and poor conditions for financing might develop, with lenders reluctant to finance expensive new LNG projects.

The firm listed a number of LNG projects that are expected to be sanctioned by 2026 and operating by 2030, which would give them the benefit of 10 years growth in LNG demand. But it also pointed out that there are a significant number of projects that are not yet ready to take FID in the next two years – after which the industry will be approaching peak LNG. "Major LNG projects may have a window of only two years to take FID in their current proposed form," the report states.

For these projects, Gas Stategies listed several factors that should be considered when attempting to deploy new capacity in a world approaching peak gas: lower capital costs for new projects will be better able to compete with existing plants and operate in lower price environments; a shorter operating lifespan; smaller capacity; and a closer geographical location to the facility's target market. Other factors include debottlenecking, the use of cheaper and smaller modular trains, and floating LNG vessels.

As the LNG market reaches a point of peak demand, the industry's structure, participants and behaviour will change significantly, the Gas Strategies report states. This, it adds, is an unavoidable fact.

Global gas demand, production and trade by scenario

		STEPS			APS			NZE		
	2023	2030	2035	2050	2030	2035	2050	2030	2035	2050
Natural gas demand (bcm)	4 186	4 430	4 422	4 377	4 003	3 493	2 466	3 617	2 257	882
Power	1 642	1 657	1 602	1 513	1 519	1 258	786	1 537	773	136
Industry	936	1 037	1 080	1 136	941	888	674	852	711	338
Buildings	809	877	868	855	780	649	418	570	307	1
Transport	151	183	191	191	143	116	56	113	67	7
Inputs to low-emissions hydrogen	-	5	13	31	25	66	219	64	120	246
Other	647	671	668	651	593	510	302	482	279	156
of which: equipped with CCUS	*14*	*29*	*43*	*74*	*69*	*134*	*356*	*144*	*247*	*463*
Natural gas production (bcm)	4 218	4 430	4 422	4 377	4 003	3 493	2 466	3 617	2 257	882
Conventional gas	2 908	2 982	2 996	3 076	2 818	2 560	1 969	2 526	1 800	635
Unconventional gas	1 310	1 449	1 425	1 301	1 185	932	497	1 091	457	247
Natural gas trade (bcm)	1 039	1 189	1 214	1 234	1 044	863	466	826	517	195
LNG	546	690	719	830	653	597	290	539	339	145
Pipeline	493	499	495	403	391	266	176	287	179	50
Natural gas prices (USD/MBtu)										
United States	2.7	3.9	4.0	4.2	3.2	3.1	2.9	2.1	2.1	2.0
European Union	12.1	6.5	6.5	7.7	6.0	5.5	5.2	4.4	4.2	4.0
China	11.5	7.2	7.1	8.3	6.9	6.4	6.2	5.0	4.9	4.8
Japan	13.0	8.3	7.8	8.7	6.8	6.2	6.2	5.0	4.9	4.8
Low-emissions gases demand (bcm equivalent)	36	78	125	362	175	375	1 023	349	643	1 397
Hydrogen	0	18	37	128	65	210	688	172	397	1 052
Biogas	26	36	48	80	43	59	107	51	74	125
Biomethane	10	24	40	154	67	106	228	126	172	221

Notes: bcm = billion cubic metres; CCUS = carbon capture, utilisation and storage; LNG = liquefied natural gas; MBtu = million British thermal units; 1 bcm equivalent of hydrogen = 0.3 million tonnes. Low-emissions hydrogen is in gaseous form, prior to any further conversion to hydrogen-based fuels, and is produced primarily from electrolysis and steam methane reformation with CCUS. Inputs to low-emissions hydrogen includes natural gas for "merchant" hydrogen sold to end-users and not natural gas converted to hydrogen onsite by end-users for self-consumption. Other includes other non-energy use, agriculture and other energy sector. Trade reflects gross volumes traded between regions modelled in the IEA Global Energy and Climate Model. The difference between production and demand is due to stock changes.

World Energy Outlook 2024, © IEA/OECD, page 144, Table 3.2

For more information, please contact:

IEA Publications
International Energy Agency

Website: www.iea.org

Contact information:
www.iea.org/contact

Source: IEA World Energy Outlook 2024, https://www.iea.org/reports/world-energy-outlook-2024, CC BY 4.0

Portugal: a living laboratory for global decarbonisation

Despite significant improvements in its economy and credit profile, investing in Portugal's renewable energy projects presents notable challenges. In its latest country analysis, ***TEI Times*** looks at Portugal's generation and consumption profiles, policy, emissions targets and ability to attract the investment needed to meet government targets.

Portugal is a global leader in climate action. Its strategy focuses on electrification, renewable expansion, and energy efficiency so as to reach carbon neutrality by 2045. The nation's strong clean energy profile and improved investment environment position it for significant growth, despite bureaucratic hurdles and high energy taxes.

Commitments

Portugal is an early adopter of carbon neutrality, aiming to achieve net zero emissions by 2045 – five years ahead of the EU's target. By 2030 it wants to cut greenhouse gas emissions 45-55 per cent compared to 2005 levels, increasing to 65-75 per cent by 2040. Additionally, the country aspires for 47 per cent of gross final energy demand and 80 per cent of generation to come from clean energy.

The decarbonisation strategy rests on three primary pillars: higher electrification rates, renewables generation, and energy efficiency. Its roadmap has a greater level of detail and more ambitious renewable energy goals compared to many of its peers. Portugal also leads many in integrating solar, wind, and green hydrogen technologies into its energy system.

Notably, hydrogen is prioritised as a solution for hard-to-decarbonise sectors. Also, the autonomous regions of the Azores and Madeira have become "living laboratories", spearheading innovative energy solutions, focusing on smart grids, and achieving high levels of renewable energy integration.

Despite its achievements, Portugal faces significant challenges on the road to carbon neutrality. Reducing reliance on energy imports remains a priority, alongside managing high energy costs, which are heavily influenced by taxes and tariffs. Further investment is required to expedite transport decarbonisation, while energy efficiency improvements are critical, particularly in buildings. Currently, two-thirds of structures lack energy performance certificates.

Energy profile

Portugal boasts a strong clean energy profile, which is poised for significant expansion in the coming years. In 2023, 61 per cent of its electricity was from renewables, 19 per cent from non-renewable energy, with net imports making up the remaining 20 per cent. This represented a 12-percentage-point increase for renewables compared to 2022, while non-renewable sources fell by 14 percentage points and imports rising 2 percentage points. Production from renewables reached 31.2 TWh, a 24 per cent year-on-year increase. This output was distributed across several technologies: wind energy contributed 25 per cent, hydroelectric power 23 per cent, biomass 19 per cent, and solar energy 7 per cent.

Portugal has successfully phased out coal fired power generation, achieving a major milestone in 2021 with the closure of its final two coal plants. The 1180 MW Sines Power Plant, operational for 35 years, was the first to cease operations in April 2021. Later that November, the 628 MW Pego Power Plant, in service for 28 years, also shut down.

Both sites now play pivotal roles in the country's energy transition. Following the Sines closure, Portuguese utility EDP announced plans to transform the site into a green hydrogen hub. This ambitious project proposed 200 MW of renewable energy, 100 MW of electrolysers, and a R&D centre. However, the initiative was suspended in 2024. Meanwhile, Spanish utility Endesa won the tender to repurpose the Pego site. Its €700 million ($728 million) project outlines a hybrid renewable energy project comprising a 365 MWp solar installation, 264 MW of wind capacity, 168.6 MW of integrated energy storage, and a 500 kW electrolyser for green hydrogen production.

Portugal has also expressed intentions to phase-out gas fired generation by 2040. However, no natural gas plant owners or operators have yet agreed to decommission their plants. Portugal saw a 30 per cent decline in natural gas consumption in 2017-2923, a downward trend that continued in 2024. Over the six-year period, gas usage for conventional purposes, such as domestic and industrial applications, fell by 20 per cent, while consumption for combined cycle plants generation experienced a sharper decline of 41 per cent, highlights the Institute for Energy Economics & Financial Analysis.

Investment environment

Portugal's economy and credit profile have improved significantly over the past decade. Moody's currently assigns the country a sovereign credit rating of A3 (Stable), while S&P rates it A- (Positive) – both classified as upper-medium grade. This marks a significant recovery from the 2012-2013 period, when the credit rating was close to "junk" status, or Non-Investment Grade Speculative. The country ranks among the top 25 per cent globally for innovation and is in 25th spot out of 40 nations on the 'EY Renewable Energy Country Attractiveness Index'. Other indicators further highlight Portugal's investment appeal: top 5 per cent globally for press freedom and within the top 20 per cent for corruption perception and rule of law. Nonetheless, its judicial system remains heavily backlogged.

Despite these achievements, investing in renewable energy projects in Portugal presents notable challenges, some common across markets and others unique to the country. Bureaucratic hurdles, such as delays in project permitting, and restricted access to financing for smaller-scale projects are widespread issues. Portugal-specific challenges include slow progress in green infrastructure approvals and smart grid expansion, limited policy clarity regarding its green hydrogen strategy, and a high energy cost structure. Only 33 per cent of the average household electricity price reflected actual energy costs, with the remaining 67 per cent due to taxes and tariffs in 2020, according to the IEA. Similarly, for industrial users, energy costs comprised just 42 per cent of the average price, while tariffs and taxes accounted for the remainder.

Year to 31 December 2023	GWh	Change (%)
Total Generation	**44,129**	**-**
Renewable Generation	31,218	*24*
Hydro	11,772	*85*
Wind	12,935	*-*
Biomass	2,900	*(12)*
Solar	3,611	*43*
Non-Renewable Generation	10,032	*(40)*
Natural Gas	9,850	*(40)*
Others	182	*(6)*
Pumped Storage Generation	**2,879**	***27***
Import balance	**10,233**	***11***
Total Demand	**50,737**	***1***

Portugal 2023 electric power generation and net demand
Source: Author using data from Redes Energéticas Nacionais, Sgps, S.A. (ed), '2023 REN Technical Data' (REN 2024) https://datahub.ren.pt/en/publications/

Policies

Portugal received significant recognition for its progressive climate and energy transition policies. These efforts are detailed in the National Energy and Climate Plan 2021–2030 (NECP 2030) and the Roadmap for Carbon Neutrality 2050 (RNC2050), both lauded as ambitious strategies.

The NECP 2030 was updated in October 2024 with revised targets to include a 51 per cent share of renewables in final energy consumption, an increase from the earlier goal of 47 per cent. It also raised its greenhouse gas emissions reduction target to 55 per cent compared to 2005 levels. Clean energy targets include 2 GW of offshore wind capacity by 2030 (10 GW by 2050). Green hydrogen production targets were also updated, aiming for 3 GW of installed electrolysis capacity, down from the previous goal of 5 GW, while setting a target of 2 GW for energy storage capacity.

To enhance the efficiency and speed of environmental and climate-related investments, the Ministry of Environment and Energy announced the creation of a new Climate Agency which will take over management of the Environmental Fund, currently overseen by the general secretariat of the Ministry. The agency will also handle other environment and climate funds. The minister emphasised that the Climate Agency will be significantly more effective and efficient, with five times the current workforce of the Environmental Fund, according to the Observador.

Investors

Portugal has cultivated a vibrant clean energy investment landscape, characterised by the involvement of robust domestic companies alongside a diverse range of international developers. An example is wind power investments announced in the past 12 months. Ireland's Gazelle Wind Power plans to establishing a local supply chain for offshore wind energy and aims to develop modular floating platforms capable of supporting wind turbines with a capacity of 15-22 MW, paving the way for large-scale offshore wind production. Another Irish firm, Simply Blue Group, partly owned by the UK-based Octopus Energy Generation, is advancing plans to construct a 990 MW floating offshore wind farm, further boosting Portugal's offshore wind potential.

Japan's Tokyo Gas has also demonstrated its interest, acquiring a 21.2 per cent stake in an existing 25.2 MW floating offshore wind farm. Germany's RWE has expressed its intention to explore offshore wind investments in the country. Finally, Spain's Iberdrola is seeking authorisation for a 274 MW onshore wind farm, which would integrate with its existing 160 MW hydropower and 880 MW pumped storage facilities.

Prepared for The Energy Industry Times by Joseph Jacobelli at Asia Clean Tech Energy Investments.

Portugal's renewables investment profile

RENEWABLES INVESTMENT PROFILE	RANK/RATING	YEAR	SOURCE
Business & Finance			
Moody's sovereign credit rating	A3 (Stable)	2023	*countryeconomy.com/ratings*
S&P sovereign credit rating	A- (Positive)	2024	*countryeconomy.com/ratings*
Global Innovation Index	31/133	2024	*wipo.int/global_innovation_index/*
EY Renewable Energy Country Attractiveness Index	25/40	2024	*ey.com*
Other			
Global Corruption Perceptions Index	34/180	2023	*transparency.org/*
Reporters Without Borders Press Freedom Index	7/180	2024	*rsf.org/en/index*
World Justice Project Rule of Law Index	28/142	2024	*worldjusticeproject.org/rule-of-law-index/*

Microgrids: leading the charge for energy security

As global power systems face unprecedented geopolitical and climate-induced challenges, distributed energy management is gaining traction as a vital strategy for securing our energy future. This makes the quest for self-sufficient microgrids for industry and infrastructure more urgent than ever, says AspenTech's **Ron Beck**.

Energy demand continues to show strong growth around the world as the population increases and urbanisation accelerates. According to independent research company, Enerdata, global energy consumption growth accelerated in 2023, increasing by 2.2 per cent, which is significantly faster than the average annual growth rate of 1.5 per cent observed between 2010 and 2019. Electricity demand is growing at a substantially faster rate, due to acceleration in demand created by EV mobility, by the rapid growth of data centres, and the growth of power needs in the global south.

According to the International Energy Agency (IEA), the global grid will need to double in size and capacity by 2040, and according to the University of Clemson Center for Advanced Manufacturing, the ability to grow the capacity of the grid will lag the demand growth by at least five-fold.

Meanwhile, climate change is intensifying, bringing with it more frequent and severe weather events. In line with this, the World Economic Foundation, highlighted in 2023 that extreme weather occurrences are not only becoming more common but also more expensive and harder to predict.

For example, Hurricane Milton in the US caused significant damage to power grids, prompting discussions on the need for more resilient energy infrastructures.

In this context, microgrids – decentralised energy systems capable of operating independently from the main grid – represent a transformative solution to the growing need for energy security. By producing, storing, and optimising energy locally, microgrids offer industries, communities, and critical infrastructure the ability to maintain power, even when external grids falter. Their increasing adoption signals a shift toward a more resilient, reliable, and sustainable future for energy generation and distribution.

Beck says the return on investment for microgrids can be significant

This presents a growing case for microgrids. Historically, centralised grids have been the backbone of energy distribution, but they face mounting pressures from ageing infrastructure, unpredictable natural disasters, and increasing energy demands. While efforts to modernise and expand these grids continue, they cannot be relied upon as the sole solution for future energy security.

Microgrids offer a compelling complementary solution. By producing energy from local sources, which can include renewable energy systems like solar or wind power, alongside energy storage technologies, they can provide a steady supply of electricity without depending solely on large, centralised networks. The ability to "island," or disconnect from the larger grid during outages or emergencies, allows microgrids to ensure uninterrupted power for their users. By working in concert with the adjoining grid at most times, microgrids provide a power solution for regions to increase overall electric grid resiliency.

This is especially critical for industries that cannot afford downtime. For instance, industrial facilities, chemical plants, and data centres can face significant financial losses if power outages disrupt their operations. In the case of energy-intensive industries like manufacturing or refining, even a brief loss of power can result in millions of pounds in lost production and damage to sensitive equipment. By incorporating microgrids, these industries gain an additional layer of protection against grid disruptions.

One of the most significant advantages of microgrids is their ability to enhance power reliability. By operating independently, they mitigate the risk of large-scale blackouts, allowing industries and communities to maintain a consistent power supply. This is particularly important as climate change continues to fuel extreme weather events that can cripple traditional grids.

Microgrids provide greater control over energy resources. Through advanced digital technologies such as AI-driven energy management systems and IoT sensors, operators can optimise energy flows in real-time. This ensures that the right amount of power is generated, stored, and distributed where needed, further enhancing operational resilience.

For critical infrastructure – such as hospitals, airports, or emergency response centres – having a reliable, localised energy supply is paramount. In the event of a disaster, microgrids can maintain power for essential services, potentially saving lives. They can also stabilise supply in the face of unexpected disruptions, making them a crucial asset in the transition to a more decentralised and resilient energy future.

For a large industrial asset, a microgrid avoids loss of production worth upwards of $1 million dollars per day, according to Gulf Energy Information, and $1 million dollars per data centre outage incident, according to Uptime Intelligence.

Microgrids are also playing a pivotal role in accelerating the shift toward cleaner energy sources. By integrating renewable energy into their systems, microgrids can help reduce reliance on fossil fuels and support the global transition to net zero emissions. Renewable energy sources, such as solar and wind, can be integrated with energy storage systems to ensure a stable supply, even when weather conditions are less than ideal.

Incorporating local renewables into a microgrid not only reduces greenhouse gas emissions but also helps to achieve sustainability targets. As industries and communities look to reduce their carbon footprints, microgrids offer an effective way to optimise the use of green energy. This can help organisations meet regulatory requirements and corporate sustainability goals while lowering energy costs.

By stabilising power supplies with renewable energy, microgrids support the broader goals of energy security, resilience, and environmental sustainability. This approach also positions microgrids as a key solution in the global push toward a low-carbon future, where decentralised, self-sufficient power systems can coexist with traditional grids.

Technology plays a central role in enhancing the performance and efficiency of microgrids. AI-powered systems can predict energy load and available renewable generation to perform load balancing and adjust supply in real-time, ensuring that renewable power and grid storage is used as efficiently as possible.

For instance, during periods of low demand, the system can reduce generation from traditional energy sources or store excess energy in batteries. During peak demand, it can draw on stored energy or ramp up local generation from renewable sources like solar or wind, ensuring that the microgrid operates efficiently without over-producing or under-producing power.

At the same time, IoT devices and sensors help operators monitor energy flows and storage levels, enabling smarter energy management by providing real-time data on various aspects of the system, such as energy generation, consumption, and storage levels. These devices collect and transmit data on critical parameters like voltage, current, temperature, and battery charge. By continuously monitoring these variables, they give operators detailed insights into how energy is flowing throughout the microgrid.

This data is processed and visualised through advanced software platforms, allowing operators to detect inefficiencies, predict maintenance needs, and make informed decisions about energy distribution.

Microgrids also provide the capability for improved peak shaving, a technique that enables asset operators to reduce demand during times of high grid usage. By drawing on stored energy or generating power locally, microgrids help reduce strain on the main grid, lower electricity costs, and minimise emissions. This optimised energy management not only improves operational performance but also supports long-term sustainability.

Microgrids with advanced control systems can balance different energy sources, including renewables and traditional generators, to ensure consistent power availability. This level of automation and control provides significant cost savings and operational efficiency, making microgrids an attractive option for businesses and communities seeking to enhance their energy independence.

Beyond reliability and sustainability, microgrids offer financial benefits that make them a smart investment for many sectors. As mentioned above, microgrids can help offset demand charges – fees imposed by utilities based on the highest amount of energy used during peak times. By optimising when to generate and store energy on-site, industries can reduce peak loads and avoid hefty demand charges.

Moreover, industries with surplus energy from their microgrids can participate in energy markets, selling the excess capacity back to the main grid, generating up to an estimated $700 000 annually for customers with onsite generation over 10 MW. This creates a two-way relationship between the user and the grid, providing financial returns while contributing to the overall stability of the energy system.

The return on investment for microgrids can be significant, especially when considering the potential costs of grid failure. As power outages become more frequent and costly, the financial case for energy resilience becomes increasingly compelling.

The evolution of microgrids points to a future where energy generation and distribution are increasingly decentralised. As the demand for energy continues to grow, and the threats to centralised grids intensify, microgrids will play an essential role in ensuring energy security.

Microgrids not only offer a solution for today's energy challenges but also provide a scalable model for future energy systems. They are a critical part of the shift toward cleaner, more resilient, and locally controlled energy networks that can adapt to the demands of tomorrow.

As the world grapples with the dual pressures of rising energy demands and the need to combat climate change, microgrids offer a clear path forward. By leading the charge for energy security, microgrids are helping to build a future where power is always on, even in the face of uncertainty.

Ron Beck is Senior Director at software and services provider, AspenTech.

Junior Isles

Abandoning a noble cause?

Baku, Azerbaijan: host to this year's COP29 climate summit and once home to the Nobel brothers. Although perhaps better known as the name behind the Nobel Prizes, the brothers also founded the first foreign oil company in the country. It was their pioneering move that perhaps put the country on the international oil map, and on the path to becoming a significant oil and gas producer. Yet if Azerbaijan's standing in the oil and gas sector was initial cause for concern over the likelihood of success at the summit, news of Donald Trump's victory in the US election cast an even darker shadow over the meeting and indeed the future of global climate change talks.

Whether concerns over Azerbaijan's roots in oil and gas were warranted is up for debate. Certainly, going into the summit, participant registration numbers showed the fossil fuel voice would override that of clean energy proponents. According to figures published in the *Financial Times*, fossil fuel industry and consultants were dominant among the Azerbaijan guests, while delegates from the G7, finance and industry were noticeably decreased.

In his opening remarks Azerbaijan's President Ilham Aliyev was unashamedly forceful about the nation's reliance on its oil and gas wealth, which generates about 90 per cent of exports and which he has repeatedly described as a "gift from god." Indeed, Azerbaijani gas exports have been a blessing to the EU in the wake of the gas crisis resulting from Russia's invasion of Ukraine.

Lambasting western critics, Aliyev said: "Unfortunately double standards, a habit to lecture other countries and political hypocrisy became kind of *modus operandi* for some politicians, state-controlled NGOs and fake news media in some Western countries."

Any insinuation that his country was not committed to the climate change movement because of its oil and gas abundance was also disputed by state-owned oil company SOCAR.

Just ahead of the summit, I had the opportunity to visit Baku to discuss the optics of holding a climate change summit in the country.

Orkhan Huseynov, Press Secretary at SOCAR, told *TEI Times*: "Initially when Azerbaijan was nominated [as COP host], the main media attacks were around: 'why hold it in a petro-state again?' My personal point of view is that you need to push where it hurts. So, we don't run away from the problem. We understand that the problems are there. There is a lot to be done but why not do it in the country, which is already having these issues? Our position is that we are not shying away from our oil and gas industry but at the same time we understand that there are things to be done, and we are ready to be part of it."

Mustafa Gurbanli, Head of the Environmental Disclosures and Green Affairs Department added: "By holding COP in Azerbaijan, there is much closer scrutiny of our operations; we are under the spotlight. If you ask me, holding COP in a petro-state only accelerates the transition because of the spotlight."

Asked whether SOCAR had any concerns about a shift to a greener economy and whether it might harm oil and gas revenues, Gurbanli, said: "…We don't have any serious concerns, but transition has to happen smoothly. It requires time. The world is saying forget about oil; let's become green… but you can't just remove it in 20 years and say forget about it. Society, people and infrastructure have to adjust. I think there needs to be a proper rulebook with the right regulatory environment. And it's very important that policy-makers are adopting policies that not only help consumers but also help producers, and we all move together in one direction."

With funding for the transition and climate adaptation expected to be the main talking point at the COP meeting, SOCAR also pointed out that money generated from oil and gas exports would be important.

"We need to finance these projects and to do so, we need to continue with fossil fuels to some extent and inject that money into renewable projects," said Huseynov.

Although rich with fossil fuel resources Azerbaijan is still making a significant effort to green its energy system.

SOCAR is in the process of transforming itself from National Oil Company into National Energy Company and by 2035 aims to have "a diversified portfolio that includes not only oil and gas, but also low-carbon businesses".

Gurbanli, said: "By 2050, SOCAR is aiming to become net zero… by 2030 we are aspiring to achieve zero routine flaring and by 2035, near zero methane emissions. And 2050 is the target to become net zero."

To reach its ambition the company says it is establishing new businesses in partnerships with "global leading companies" in areas such as renewables (solar and wind), green hydrogen and new technologies "to support development of specific territories of Azerbaijan". Earlier this year it founded SOCAR Green LLC, a company that is focusing on low-carbon businesses.

SOCAR's partnership with bp is one example of its partnerships aimed at decarbonisation. Together they will undertake the Sunrise project – a 240 MW solar plant that will generate power for the electrification of Sangachal oil and gas terminal, reducing CO_2 emissions by 260-330 kt per year. Even more notable is its partnership with Masdar to develop three major solar and wind projects with a capacity of 1 GW.

Groundbreaking on the projects in June this year follows Masdar's completion of the 230 MW Garadagh solar plant in October 2023 – Azerbaijan's first foreign investment-based independent solar power project, and the largest solar plant in the region.

SOCAR with its partners has committed to 2.3 GW of renewable capacity, which is twice the renewable energy capacity required for the national target. It's a significant commitment, especially when considering the country's peak demand is 4.5 GW, occurring just once a year, according to the Ministry of Energy.

Commenting on the importance of COP29 to the country's renewable plans, Javid Abdullayev, Director, Azerbaijan Renewable Energy Agency under the Ministry of Energy of the Republic of Azerbaijan, said: "COP29 is important to show what we are doing in the field of green energy and share our experience with other countries."

As an important oil and gas producer it is important that Azerbaijan and the likes of SOCAR takes ownership in taking a lead in the energy transition. Yet such examples are few and far between. A recent report from Carbon Tracker warned that oil and gas companies are falling short in efforts to curb carbon emissions, claiming that "progress has basically stalled".

The report was the latest warning of slower progress on curbing emissions as thousands of country leaders and executives gathered in Azerbaijan. Notably, it came hot on the heels of Donald Trump's re-election as US President, with his looming promise to "drill baby, drill" and threat to remove the US from the Paris Climate Agreement.

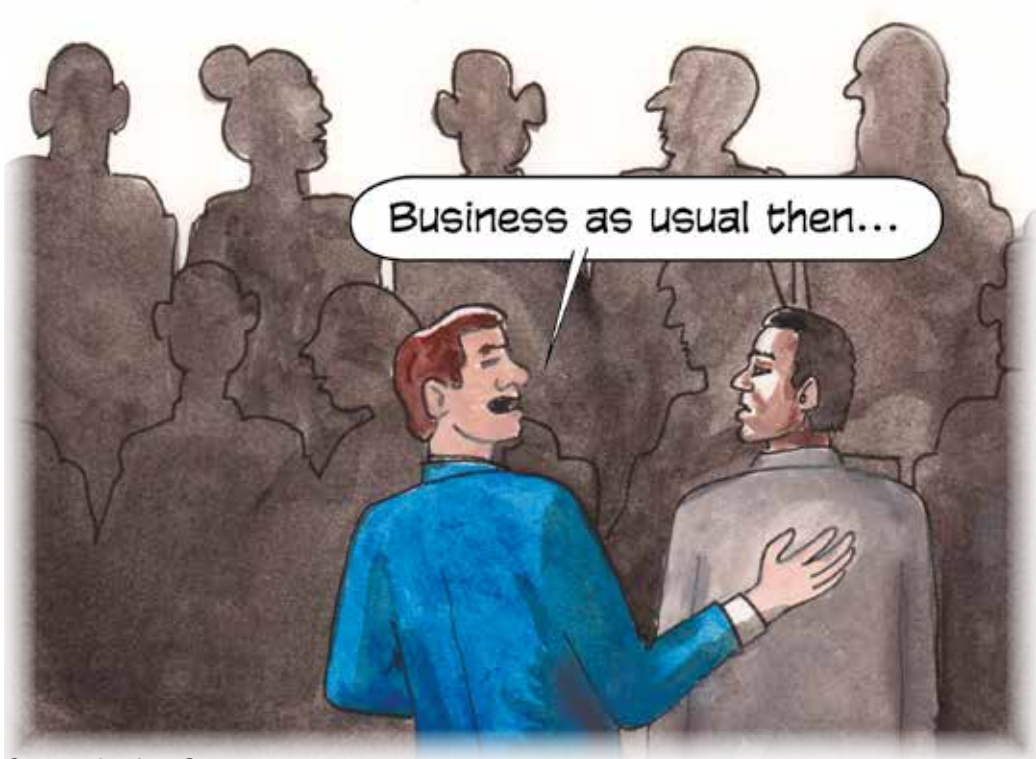
As COP kicked-off John Podesta, US President Joe Biden's top climate adviser conceded action to limit global warming "may be put on the back burner" after Trump's return to the White House but sought to reassure the world that this could "slow, not stop" the shift away from fossil fuels.

Podesta said "we should believe" Trump when he said he would "reverse much of [the] progress" the US had made on tackling climate change. "In January, we will inaugurate a president whose relationship to climate change is captured by the words: 'hoax' and 'fossil fuels'," he said.

"Are we facing new headwinds? Absolutely. But we won't revert back to the energy system of the 1950s. No way," said Podesta.

Unfortunately, such words ring hollow with the news that Chris Wright, the Chief Executive of oilfield services group Liberty Energy is to be the new US Energy Secretary in the Trump administration.

What would the Nobel brothers, Alfred, Ludvig and Robert have made of it all back in 1876? Would they have "drilled baby, drill" in pursuit of building their oil empire or would Alfred have led the climate change movement with the same foresight that founded the prizes which recognise those that have conferred the greatest benefit to humankind?



Cartoon by Jem Soar