THE ENERGY INDUSTRY TIMES

July-August 2024 • Volume 17 • No 5 • Published monthly • ISSN 1757-7365 www.teitimes.com

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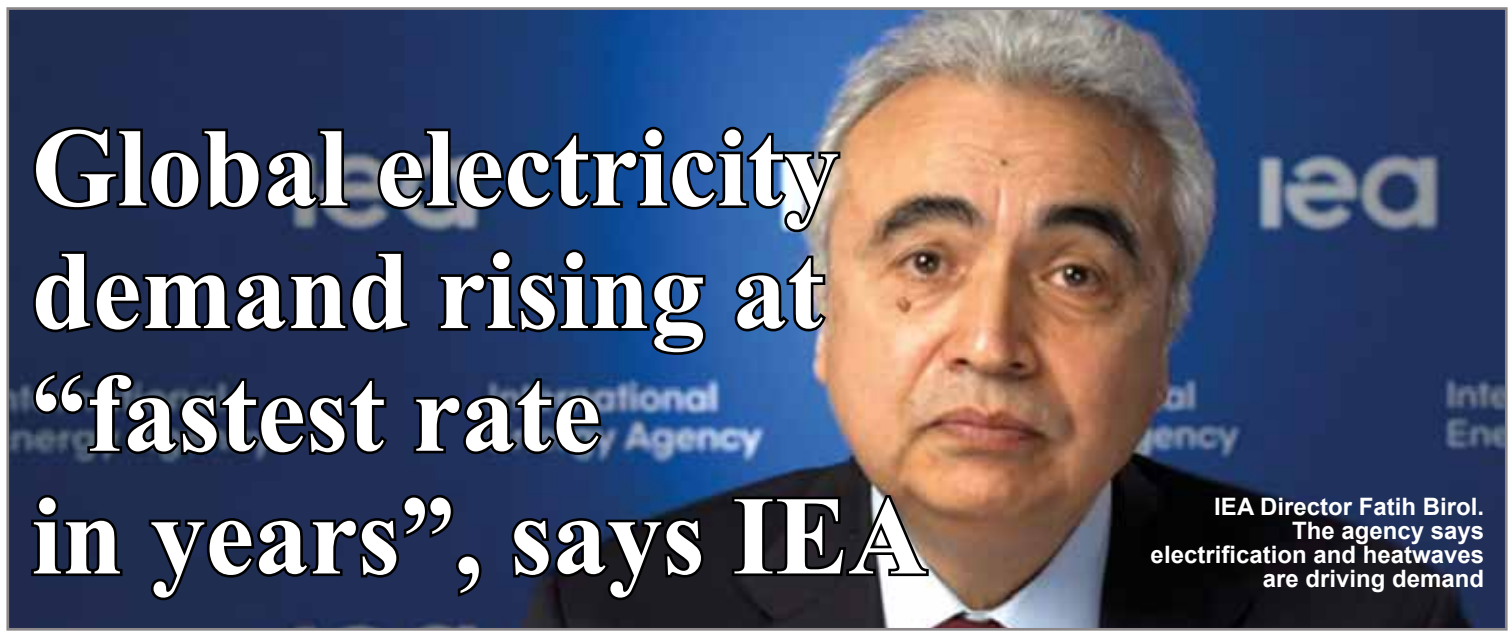
Global electricity demand rising at "fastest rate in years", says IEA



IEA Director Fatih Birol. The agency says electrification and heatwaves are driving demand

Growth in demand in 2024 and 2025 is forecast to be among the highest levels in the past two decades a new IEA report finds, with solar PV alone expected to meet half of the increase.

The world's demand for electricity is rising at its fastest rate in years, driven by robust economic growth, intense heatwaves and increasing uptake of technologies that run on electricity such as electric vehicles (EVs) and heat pumps, according to a new report by the International Energy Agency (IEA). At the same time, renewables continue their rapid rise, with solar PV on course to set new records.

Global electricity demand is forecast to grow by around 4 per cent in 2024, up from 2.5 per cent in 2023, the IEA's 'Electricity Mid-Year Update' finds. This would represent the highest annual growth rate since 2007, excluding the exceptional rebounds seen in the wake of the global financial crisis and the Covid-19 pandemic. The strong increase in global electricity consumption is set to continue into 2025, with growth around 4 per cent again, according to the report.

Renewable sources of electricity are also set to expand rapidly this year and next, with their share of global electricity supply forecast to rise from 30 per cent in 2023 to 35 per cent in 2025. The amount of electricity generated by renewables worldwide in 2025 is forecast to eclipse the amount generated by coal for the first time. Solar PV alone is expected to meet roughly half of the growth in global electricity demand over 2024 and 2025 – with solar and wind combined meeting as much as three-quarters of the growth.

Despite the sharp increases in renewables, global power generation from coal is unlikely to decline this year due to the strong growth in demand, especially in China and India, according to the report. As a result, carbon dioxide (CO_2) emissions from the global power sector are plateauing, with a slight increase in 2024 followed by a decline in 2025.

However, considerable uncertainties remain: Chinese hydropower production recovered strongly in the first half of 2024 from its 2023 low. If this upward trend continues in the second half of the year, it could curb coal fired power generation and result in a slight

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COP28 renewables target at risk despite rapid growth

The 'Renewable Energy Statistics 2024' released by the International Renewable Energy Agency (IRENA) last month shows that despite renewables becoming the fastest growing source of power, the world risks missing the tripling renewables target pledged at COP28. To stay the course, the world will now have to grow renewables capacity at a minimum 16.4 per cent rate annually through 2030.

The unprecedented 14 per cent increase in renewables capacity during 2023 established a 10 per cent compound annual growth rate (2017-2023). Combined with the constant decreasing additions of non-renewable capacity over the years, the trend sees renewable energy on its way to overtaking fossil fuels in global installed power capacity.

However, if last year's 14 per cent increase rate continues, the tripling target of 11.2 TW in 2030 outlined by IRENA's 1.5°C Scenario will fall 1.5 TW short, missing the target by 13.5 per cent. Furthermore, if the world keeps the historic annual growth rate of 10 per cent, it will only accumulate 7.5 TW of renewables capacity by 2030, missing the target by almost one-third.

IRENA Director-General, Francesco La Camera, said, "Renewable energy has been increasingly outperforming fossil fuels, but it is not the time to be complacent. Renewables must grow at higher speed and scale. Our new report sheds light on the direction of travel; if we continue with the current growth rate, we will only face failure in reaching the tripling renewables target agreed in the UAE Consensus at COP28, consequently risking the goals of the Paris Agreement and 2030 Agenda for Sustainable Development."

Dr. Sultan bin Ahmed Al Jaber, Minister of Industry and Advanced Technology, COP28 President, warned: "… while we are making progress, we are off track to meet the global goal of tripling renewable energy capacity to 11.2 TW by 2030. We need to increase the pace and scale of development. That means increasing collaboration between governments, the private sector, multilateral organisations, and civil society.

"Governments need to set explicit renewable energy targets, look at actions like accelerating permitting and expanding grid connections, and implement smart policies that push industries to step up and incentivise the private sector to invest.

"Additionally, this moment provides a significant opportunity to add strong national energy targets in NDCs [Nationally Determined Contributions] to support the global goal of keeping the 1.5°C target within reach. Above all, we must change the narrative that climate investment is a burden to it being an unprecedented opportunity for shared socio-economic development."

In terms of power generation, the latest data available for 2022 confirmed yet again the regional disparity in renewables deployment. Asia holds its position as leader in global renewable power generation with 3749 Terawatt hours (TWh), followed for the first time by North America (1493 TWh). The most impressive jump occurred in South America, where renewable power generation increased by nearly 12 per cent to 940 TWh, due to a hydropower recovery and a greater role of solar energy.

With a modest growth of 3.5 per cent, Africa increased its renewable power generation to 205 TWh in 2022, despite the continent's tremendous potential and immense need for rapid, sustainable growth. Acknowledging the urgent need for support and finance, IRENA is advancing the Accelerated Partnership for Renewables in Africa (APRA) initiative and is preparing an investment forum focused on APRA's member countries later this year.

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decline in global power sector emissions in 2024.

Some of the world's major economies are registering particularly strong increases in electricity consumption. Demand in India is expected to surge by a massive 8 per cent this year, driven by strong economic activity and powerful heatwaves. China is also set to see significant demand growth of more than 6 per cent, as a result of robust activity in the services industries and various industrial sectors, including the manufacturing of clean energy technologies.

After declining in 2023 amid mild weather, electricity demand in the US is forecast to rebound this year by 3 per cent amid steady economic growth, rising demand for cooling and an expanding data centre sector. By contrast, the European Union will see a more modest recovery in electricity demand, with growth forecast at 1.7 per cent, following two consecutive years of contraction amid the impacts of the energy crisis.

In many parts of the world, increasing use of air-conditioning will remain a significant driver of electricity demand, says the IEA. Multiple regions faced intense heatwaves in the first half of 2024, which elevated demand and put electricity systems under strain, the report finds.

Sadamori says the clean energy share is "encouraging"

"Growth in global electricity demand this year and next is set to be among the fastest in the past two decades, highlighting the growing role of electricity in our economies as well as the impacts of severe heatwaves," said Keisuke Sadamori, IEA Director of Energy Markets and Security. "It's encouraging to see clean energy's share of the electricity mix continuing to rise, but this needs to happen at a much faster rate to meet international energy and climate goals. At the same time, it's crucial to expand and reinforce grids to provide citizens with secure and reliable electricity supply – and to implement higher energy efficiency standards to reduce the impacts of increased cooling demand on power systems."

With the rise of artificial intelligence (AI), the electricity demand of data centres is drawing increased attention, underscoring the need for more reliable data and better stocktaking measures. The report highlights the wide range of uncertainties concerning the electricity demand of data centres, including the pace of deployment, the diverse and expanding uses of AI, and the potential for energy efficiency improvements. Better collection of electricity consumption data of the data centre sector will be essential to identify past developments correctly and to better understand future trends.

Von der Leyen re-election will continue clean energy drive

The re-election of Ursula von der Leyen as President of the European Commission has been welcomed by the electricity sector, as the bloc continues to face unprecedented challenges. **Junior Isles**

The re-election of Ursula von der Leyen as the President of the European Commission looks set to continue the European Union's drive towards meeting its clean energy goals while improving industrial competitiveness.

Europe's electricity sector welcomed von der Leyen's renewed mandate, secured with 401 votes in favour.

"Von der Leyen set out a pragmatic, yet ambitious agenda for the next five years to address the new challenge landscape the EU is facing with geopolitical tensions, sharpened industrial competition, on top of the impacts from increasingly extreme weather," said Eurelectric's Secretary General, Kristian Ruby.

Eurelectric, the organisation representing the interests of the European electricity industry, noted that competitiveness and prosperity are "the new buzzwords for this Commission", along with a renewed emphasis on defence and energy security.

It also stated: "While missing from her speech this morning, her political guidelines recognise grid infrastructure as a key technology in need of higher investments. This is a key aspect for the power sector, which has been very vocal on the need to speed up investments in grid infrastructure to the tune of €67 billion of annual investments in distribution grid from 2025 to 2050.

"Infrastructure is one of the 4 'I's Eurelectric has advocated for prioritisation in the new legislative mandate. With the other I's – implementation, investment and industrial competitiveness – prominently featuring in von der Leyen's plan, it is safe to say our voice has been heard."

In particular, Eurelectric welcomed von der Leyen's announcement of a new Clean Industrial Deal to keep industry competitive while decarbonising the economy.

"We support the call for implementing the Green Deal and positively note the reference to scaling-up investments in low-carbon green infrastructure as well as the creation of a Savings and Investment Union to back this vision with the necessary financial means," said Ruby.

Ruby's comments came as Eurelectric also reported that generation of clean electricity in Europe is setting records. In the first half of 2024, renewables made up more than 50 per cent of all power generation in Europe while nuclear provided a stable share of 24 per cent. It said demand for power, however, remains low due to sluggish growth, deindustrialisation and mild weather. Stimulating demand for electricity will be paramount to ensure continued investments in clean generation.

Europe's power generation is decarbonising at unprecedented pace. The latest figures from Eurelectric's Electricity Data Platform, ELDA, show that 74 per cent of electricity produced in the EU in the first half of 2024 came from renewable and low-carbon energy sources,. This is a significant increase compared to the 68 per cent share in 2023. The main reasons behind this were an unprecedented influx of renewables on the grid combined with the stabilisation of the nuclear fleet.

"The pace of change is impressive. These figures document that the decarbonisation efforts of electricity companies are years ahead of any other sector," said Ruby.

While the numbers on the supply side are promising, the same cannot be said for electricity demand. In the first half of 2023 power demand in the EU decreased by 5.1 per cent compared to same period in 2022 and has continued to remain low in 2024 – 4.8 per cent lower than in H1 2022. This trend is mainly due to industry relocating abroad, warmer temperatures, energy savings and slow economic growth.

German TSOs reach important milestone in path to future high voltage transmission grid

The four German transmission system operators – 50Hertz, Amprion, TenneT and TransnetBW – are launching an innovation partnership with industrial partners Siemens Energy, GE Vernova and Hitachi Energy.

By developing a new generation of multi-terminal HVDC technology, Hitachi Energy, GE Vernova, and Siemens Energy in partnership with the four German TSOs, will create an HVDC system in which multiple terminals can connect with one another. This multi-terminal grid will enable electricity to travel where needed for a highly efficient electron highway.

Commenting on the initiative, Tim Meyerjürgens, COO of TenneT, said: "With this partnership, we are joining forces and shaping the infrastructure of the future together. In the German North Sea alone, 70 GW of offshore wind energy are planned, which must not only be brought ashore efficiently, but also distributed throughout the country in the most area- and cost-efficient way possible. At the same time, the further integration of renewable energies is increasing the demands on grid stability and security of supply. We are therefore focusing on new innovative technologies and are realising a large-scale meshed direct current grid for the first time. Together, we are paving the way for the climate-neutral grid."

DC switchgear with DC circuit breakers are central to realising DC multi-terminal hubs. They enable the efficient utilisation and distribution of very large amounts of wind power from the North Sea coast by linking direct current lines and flexibly transporting the energy to where it is needed. For the first time, this will create HVDC networks that will improve the utilisation of direct current lines and at the same time support the existing alternating current grid as the backbone of energy transmission.

The R&D contract also includes the conceptualisation, design and development of enabling technologies, specifically a new-to-market 525 kV DC circuit breaker that will allow these and other TSOs to trip and isolate faults in the HVDC system.

HVDC is the most efficient way to transmit bulk power over long distances and is essential to integrating renewable wind and solar energy into the grid. With today's available HVDC Voltage Sourced Converter (VSC) technology, HVDC systems are point-to-point, bi-directional power transmission systems that have one HVDC converter station at each end.

Emissions from energy sector hit record high as fossil fuel use increases

Last year has been called "another year of highs" in the latest 'Statistical Review of World Energy'.

The 73rd annual edition of the Review – published by the Energy Institute (EI) and co-authors KPMG and Kearney – presented for the first time full global energy data for 2023. The report, revealed five key stories.

- Record global energy consumption, with coal and oil pushing fossil fuels and their emissions to record levels
- Global primary energy consumption overall was at a record absolute high, up 2 per cent on the previous year to 620 Exajoules (EJ).
- Global fossil fuel consumption reached a record high, up 1.5 per cent to 505 EJ (driven by coal up 1.6 per cent, oil up 2 per cent to above 100 million barrels for first time, while gas was flat). As a share of the overall mix they were at 81.5 per cent, marginally down from 82 per cent last year.
- Emissions from energy increased by 2 per cent, exceeding 40 gigatonnes of CO_2 for the first time.
- Solar and wind pushed global renewable electricity generation to another record level.

Commenting on the report, EI President Juliet Davenport OBE HonFEI said: "In this year's 'Statistical Review', we report on another year of highs in our energy-hungry world. 2023 saw record consumption of fossil fuels and record emissions from energy, but also record generation of renewables, driven by increasingly competitive wind and solar energy."

EI Chief Executive Nick Wayth CEng FEI, added: "The progress of the transition is slow, but the big picture masks diverse energy stories playing out across different geographies. In advanced economies we observe signs of demand for fossil fuels peaking, contrasting with economies in the global south for whom economic development and improvements in quality of life continue to drive fossil growth."

The Review found that growth economies struggle to curb fossil fuel growth, although renewables accelerate in China.

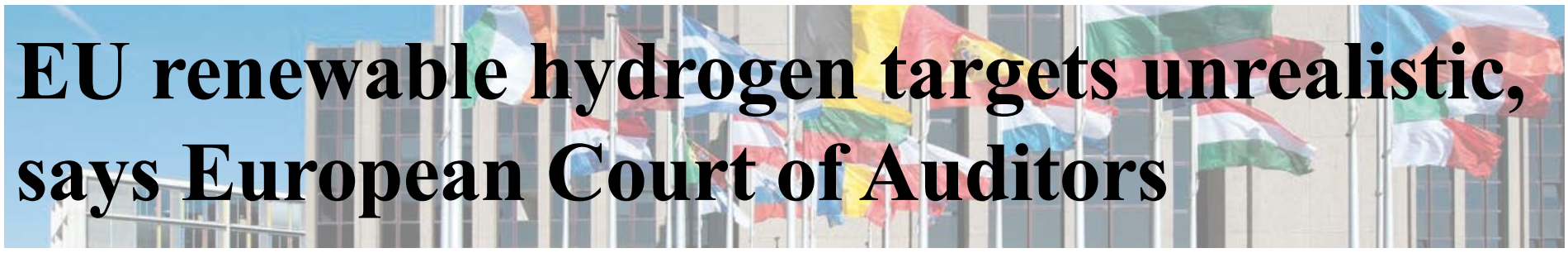
China's full return post-Covid saw fossil fuel use increase to a new high, up 6 per cent, but as a share of primary energy it has been in decline since 2011, down to 81.6 per cent in 2023. China added 55 per cent of all renewable generation additions in 2023, i.e. more than the rest of the world combined. It also overtook Europe on an energy per capita basis for the first time.

In India fossil fuel consumption was up 8 per cent, accounting for almost all demand growth, and stood at 89 per cent share of overall consumption. For the first time, more coal was used in India than Europe and North America combined.

In Africa primary energy consumption fell in 2023 by 0.5 per cent. Fossil fuels accounted for 90 per cent of overall energy consumption, with renewables (excluding hydro) at only 6 per cent of electricity.

Simon Virley CB FEI, Vice Chair and Head of Energy and Natural Resources, KPMG in the UK said: "In a year where we have seen the contribution of renewables reaching a new record high, ever increasing global energy demand means the share coming from fossil fuels has remained virtually unchanged at just over 80 per cent for yet another year.

"With CO_2 emissions also reaching record levels, it's time to redouble our efforts on reducing carbon emissions".



EU renewable hydrogen targets unrealistic, says European Court of Auditors

- Targets based on political will not analysis
- New grants invest billions in hydrogen production and transport

Janet Wood

European Union targets for producing and importing renewable hydrogen fuel are unrealistic and unlikely to be met, according to a new report from the European Court of Auditors (ECA).

The ECA said the European Commission's targets to produce up to 10 Mt of renewable hydrogen by 2030 and import another 10 Mt were based on political will rather than analysis. Another 2030 target, to install 40 GW of electrolysers to produced green hydrogen, was an idea suggested by a hydrogen lobby.

Currently projects at an advanced stage would add less than 5 GW of production capacity by 2030, although about 50 GW is at an earlier stage, the ECA said.

"EU industrial policy in the field of renewable hydrogen needs a realistic vision," said auditor Stef Blok. The ECA wants the European Commission to better target scarce EU funds and to produce an updated strategy specifying which industries the EU wants to retain.

A European Commission spokesperson said: "Our work is far from over. We now need to accelerate the deployment and uptake of renewable and low-carbon hydrogen in Europe."

Meanwhile governments have recently announced aid for hydrogen projects as well as renewables. The Spanish government announced €1.2 billion in grants for renewable hydrogen projects, with the Ministry for Ecological Transition and the Demographic Challenge saying, "it is a step forward in the aid granted so far for this technology".

The German Ministry for Economic Affairs and Climate Action recently announced €4.6 billion in state and federal funding for 23 projects along the hydrogen value chain. Recipients included a 370 MW electrolyser, a 56 km hydrogen pipeline and a hydrogen storage facility. In several cases, 'clusters' have formed that cross state boundaries, with pipeline, storage and generation infrastructure and connections to industrial customers.

Other planned projects are intended to enable pipeline-based hydrogen imports to Germany in the future by connecting pipelines from neighbouring countries.

Economy and Climate Action Minister Robert Habeck said: "An efficient hydrogen infrastructure plays a key role in enabling the decarbonisation of industry and the energy sector," adding, "Hydrogen pipelines will be the lifeblood of industrial centres."

The German funding forms the bulk of the €6.9 billion Hy2Infra funding package for hydrogen infrastructure named as Important Projects of Common European Interest (IPCEI). Hy2Infra was put forward by France, Germany, Italy, the Netherlands, Poland, Portugal and Slovakia and approved by the European Commission.

Meanwhile, a report commissioned by E.On and Thüga has identified locations in Germany where electrolysers can support the energy system. The report by EWI says the electrolysers could help avoid curtailments and relieve pressure on all levels of the electricity grid.

Two Czech and one Romanian nuclear sites set to add units

A consortium led by Korea Hydro & Nuclear Power has been named as the preferred bidder to build up to four nuclear plants in Czechia.

When finalised, the deal would see two new 1000 MW plants built at Dukovany and two at Temelin, both existing sites. Sung Tae-yoon, Director of national policy at the presidential office, said: "We thank the Czech Republic for selecting South Korea (as the preferred bidder) in the largest investment project in (Czechia)."

Meanwhile, the European Commission has given the green light to adding two more units at Romania's Cernavoda nuclear site. Energy Minister Sebastian Burduja said recently that the new reactors are expected to "make an essential contribution to national and regional energy security by producing clean, zero-emission energy." The Commission confirmed that the project is in line with the objectives of the Euratom Treaty.

The nuclear resurgence may spread to Italy, 35 years after the country shut down its plants.

Environment and Energy Security Minister Gilberto Pichetto Fratin said: "To have a guarantee of continuity on clean energy, we must insert a quota of nuclear energy." He plans to legislate to allow investment in small modular reactors, which he said should account for at least 11 per cent of Italy's electricity consumption by 2050.

Baltic states set February date to synchronise with Europe grid

The electricity grid operators of Estonia, Latvia and Lithuania have informed Russia and Belarus that they will disconnect from the Moscow-controlled post-Soviet power grid in February 2025.

The 2001 BRELL agreement under which the three grids – operated by Lithuania's Litgrid, Latvia's AST and Estonia's Elering – are synchronised with the Russian and Belarus grids, expires in February 20205 and will not be extended, they said. Instead, the Baltic systems plan to synchronise with the continental European system on February 9th.

Estonia, Latvia, Lithuania and Poland agreed with the European Union's Executive Commission in 2019 to coordinate on connecting the Baltic nations to the EU's power network by the end of 2025. However, Russia's war in Ukraine led the Baltic countries to speed up the project.

The Baltic countries already have stopped buying electricity from Russia, but they remain physically connected to its grid.

"We will disconnect and dismantle the last physical connections with Russian and Belarusian grids," Litgrid CEO Rokas Masiulis said, calling the move an "ambitious energy independence project". Estonia's grid operator Elering said: "Synchronisation with Continental Europe Synchronous Area will allow for independent, stable and reliable frequency control of the Baltic states electricity grids and will increase energy security in the region."

New UK government makes clean energy a mission

- Ban on onshore wind lifted
- 'Great British Energy' launched to step-up renewables delivery

Janet Wood

The new Labour government wants the UK to become a clean energy 'superpower' as one of five elements of a 'mission led' administration. Secretary of State Ed Miliband announced a new 'mission control' to deliver that aim, headed by Chris Stark, former Chief Executive of the Climate Change Committee (CCC), which is tasked with checking progress towards the UK's net zero by 2050 goal.

A new programme of legislation confirmed a bill to set up a publicly-owned clean power company, Great British Energy, as well as planning reforms to speed up new infrastructure such as grid upgrades.

GB Energy will work with The Crown Estate to bring forward offshore wind and other offshore technologies, and with Great British Nuclear on new nuclear plants. It is intended to 'crowd in' investment, with seed funding of around £8 million over the next five years and to help grow the UK energy supply chain. It is also expected to fund and grow local community energy projects.

The government had already launched an Onshore Wind Industry Taskforce after removing a ban on onshore wind. RenewableUK's Chief Executive Dan McGrail, a member, said: "This ambitious collaborative effort will involve industry, national and devolved governments, businesses and communities working together to find a new way forward. There is a clear mandate for this, as government polling shows that 78 per cent of the public support onshore wind."

Energy UK Chief Executive, Emma Pinchbeck highlighted the new government's "welcome commitment to hit the ground running with its clean energy mission". Stressing the importance of private investment, she said: "The sense of purpose and ambitious action articulated by the government sends an important message to investors at a time of increased international competition for funding."

The Labour government's election came as the CCC said in its annual report that the country had credible plans for only a third of the reductions required to maintain a trajectory to net zero carbon emissions by 2050.

It said the UK's electricity sector emissions have more than halved since 1990, but this was because of a coal phase-out and the roll-out of renewables. To meet the 2030 target annual offshore wind installations would need to increase three-fold, onshore wind capacity must double and solar must increase five-fold

Energy Secretary Ed Miliband said: "The good news is that this report confirms that a clean energy future is the best way to make Britain energy independent, cut bills, create good jobs, and tackle the climate crisis."

Germany's plans for more wind power drives case for reopening storage

Germany's measures to speed wind power expansion are working, according to the German Wind Energy Association. It said there was a 19 per cent slowdown in wind power expansion in the first half of 2024, but approvals for future projects increased by 32 per cent and processing times fell. However, the group said the increase was not enough to reach the 2030 target of 115 GW.

"To achieve the necessary expansion, approvals must be turned into realised projects," the association said.

In the first quarter of 2024, Germany achieved a 58.4 per cent share of renewables, but its 2030 target is an 80 per cent share of renewable energies in gross electricity consumption.

The need to manage fluctuating supplies has prompted Uniper to announce plans to invest €250 million to bring the Happurg pumped storage power plant back into operation. The plant in Bavaria has been shut down since 2011 but at 850 MWh, it is one of the state's, largest pumped storage plants and Minister of Economic Affairs and Energy, Hubert Aiwanger, has campaigned for the restart.

"We need these large storage facilities in order to be able to react flexibly to fluctuations in the power grid and to keep the grid stable," said Aiwanger.

The restart is scheduled for 2028.

Can the new government scale up network capacity?

Britain's Labour government has hit the ground running in terms of enabling renewables deployment. It has removed the blockers to onshore wind in England, granted planning consent to nearly 1.4 GW of new, large-scale solar PV projects and established Great British Energy. But Aurora Energy's **Ashutosh Padelkar** asks whether it can deliver the network capacity to ensure projects can be connected without significant delays.

Grid connections' and curtailment was voted the most significant barrier to delivering European renewables targets by 2030 at Aurora's Spring Forum in March 2024, with over a third of the five hundred delegates choosing this option.

Governments across Europe have pushed for increasingly ambitious targets for renewables, with a target of up to 55 GW offshore wind in Great Britain by 2030 set by the new Labour government. But insufficient grid capacity threatens to derail this ambition in two ways: new projects can't secure grid connections, and existing projects may face curtailment at times when there isn't sufficient grid capacity to transport electricity from where it is produced to consumers. In 2023, over 4TWh of low-carbon generation was curtailed, with a similar increase in thermal generation, which cost the consumers £1.25 billion.

Expanding grid capacity has historically been challenging due to local planning and consenting regulations, with particular opposition to the development of pylons. For example, at least 4 GW of offshore wind generation capacity will connect in East Anglia over the next few years, which necessitates the expansion of grid capacity in East Anglia to carry the clean energy generated by these projects to demand centres in London and the Midlands.

However, the development of a vital new 189 km line has been opposed by local MPs in both the previous and the current parliament. In the previous parliament, the opposition came from six Conservative MPs, including the Environment Secretary at the time, and in the current parliament, the Green Party's co-leader, MP for Waveney Hills, Suffolk called for a pause on the development to consider other options earlier this month. Similarly, in Aberdeenshire, farmers held a tractor march in April to protest the development of another vital line. Finally, in Lincolnshire, residents have opposed the development of a 140 km line citing concerns around the impact on landscapes and the tourism business. The Liberal Democrats and Reform UK have both also opposed the development of pylons through the countryside.

Padelkar: Grid deployment is location specific and the impact these sensitivities would have on assets is also location-specific

Labour has hit the ground running in terms of enabling renewables deployment. It removed the blockers to developing onshore wind in England, granted planning consent to nearly 1.4 GW of new, large-scale solar PV projects and founded Great British Energy in partnership with The Crown Estate to speed up the deployment of offshore wind, all in the first three weeks of being in office. However, the successful grid integration of all of these projects hinges on the availability of sufficient network capacity to ensure they can be connected without significant delays and don't face curtailment once operational.

Historically, given the challenges around planning as well as the delays in regulatory approvals, a significant expansion in network capacity was believed to be unlikely.

For example, it typically takes around 12 years from initial scoping to the commissioning of a new transmission line, with some lines taking even longer due to local opposition, which has to be assuaged through several rounds of consultations. However, Labour has shown the intention to simplify the planning regime for renewables and housing and could take steps to accelerate the deployment of networks.

This signifies a transformation in the outlook for network deployment: historically, the consensus in the industry was that we would struggle to deploy adequate network capacity and consequently see high levels of grid congestion and curtailment. With a Labour government keen to cut the red tape around planning and other regulatory barriers, we could scale up our network capacity over the next 10-15 years. The 'Beyond 2030' publication from National Grid, which moves a majority of the new lines offshore along the eastern coast, also suggests improved deliverability over onshore lines since fewer local authorities will need to be appeased.

From an investor's perspective, this opens up a multi-dimensional space of possibilities in terms of network deployment: instead of being able to assume a low or moderate level of network deployment, they must now consider a range of scenarios from low to high levels of deployment both onshore and offshore, and consider what these possibilities mean for their assets. Alongside sensitivities of demand, commodity prices, levels of renewables deployment, investors must now consider levels of network deployment as a sensitivity.

Grid deployment is location specific, and as a result the impact these sensitivities would have on assets is also location-specific, in addition to the asset technology, with renewables seeing different impacts relative to flexible and baseload assets, whilst assets in southern Scotland face different impacts compared to those located in Northern England. According to in-house modelling at Aurora Energy Research, a battery located in the South of England could lose almost 10 per cent of its average annual operating profits between 2030-40 if we see rapid deployment of networks over the next few years by losing out on opportunities to be called upon in the balancing mechanism. The impact on renewables is specific to their connection agreements. For example, transmission-connected renewable generators are currently compensated in the balancing mechanism if they are turned down.

However, for distribution-connected renewables, non-firm connection agreements have become increasingly prevalent where, access to the grid may be restricted dynamically depending on the level of congestion the Distribution Network Operator sees. Typically, such connections can offer forecasts of up to 100 per cent curtailment, which makes them unappealing to most investors and developers. However, the landscape could change quickly if barriers around grid deployment are removed, and what appeared to be risky projects could offer attractive returns.

Finally, coming to baseload generation, combined cycle gas turbines (CCGTs) are currently most often called upon to replace renewables energy generation that is curtailed due to grid constraints. If congestion in the grid is reduced by expanding the network, these generators would have fewer opportunities to be called upon in the balancing mechanism, consequently losing revenues. Analysis by Aurora Energy Research also shows that a CCGT located in the South of England could lose 10 per cent of its average operating profits between 2030-40 in such a scenario that sees high network deployment.

One further consideration is the relative impact of the deployment of onshore and offshore networks. Since offshore networks do not face the barrier of planning and consenting to the same extent as onshore lines, a possible scenario could see significant deployment of offshore HVDC lines without the onshore reinforcements to back them up. Depending on how these lines are operated, they could move congestion on days with high wind generation from the Scottish borders down to Humberside and Lincolnshire – where most of the offshore connections from Scotland connect, and also where residents opposed the development of an essential line – possibly creating new constrained boundaries.

The possibility of accelerated network deployment is beneficial to the system by reducing costs for consumers, as well as emissions – Aurora finds that in 2030, 6 $MtCO_2e$ emissions could be avoided if all the network capacity necessary by 2030 is deployed, amounting to over 20 per cent of the total power sector emissions in that year. However, this possibility also adds additional dimensions to the space of probable scenarios that investors must consider – dimensions which could, in the short- to mid-term, be almost as consequential as the level of renewables deployment.

Ultimately, the lack of progress in scaling up grid capacity represents a lack of political will. In the United States, seven onshore HVDC lines amounting to over 17 GW of total capacity are currently under construction; India installed three onshore HVDC lines with a capacity of 6 GW each over a cumulative distance of nearly 5000 km in the last decade. National Grid's plans to install four offshore 2 GW HVDC lines between Scotland and England by 2030 seem far more achievable from a global perspective.

Ashutosh Padelkar is Senior Associate at Aurora Energy Research.

Improving cyber resilience in the energy sector

Faced with an ever-increasing number of threats and attacks, the UK energy sector has become a prime target for criminals seeking to cause disruption to critical infrastructure and steal sensitive information. Armor's **Temi Akinlade** takes a closer look at the cyber security issues the energy industry is facing, and the measures organisations should have in place to protect themselves.

Akinlade: Cyber security should be treated with the same seriousness as any other organisational threat

Traditionally recognised for its emphasis on operational technology (OT) and ensuring the availability of critical infrastructure, the energy sector is now experiencing a significant transformation. The proliferation of Internet of Things (IoT) devices, sophisticated IT systems, and their integration with corporate networks and cloud-based, AI-driven applications has expanded the attack surface and introduced new vulnerabilities which have driven cyber security up the agenda.

Faced with an ever-growing number of threats and attacks, the UK energy sector has become a prime target for malicious actors seeking to disrupt critical infrastructure, steal sensitive information, and compromise national security.

Over recent years, the energy sector has increasingly relied on data to monitor efficiency, deliver services, and provide customers with better visibility into their usage. This shift means that security must now also ensure confidentiality and integrity, alongside availability. The traditional OT security measures are no longer sufficient in this new reality. This convergence of OT and IT systems has blurred the lines between traditional operational security and cybersecurity, necessitating a holistic and comprehensive approach to risk management.

Recent data from IBM reveals the alarming reality of cyber threats in the UK energy sector, accounting for nearly a quarter (24 per cent) of all cyber incidents in the country. This alarming figure underscores the urgency for enhanced security measures and highlights the sector's vulnerability compared to other industries such as manufacturing and finance.

The consequences of successful cyber attacks on the energy sector can be far-reaching and devastating. Disruptions to energy supply can lead to widespread chaos, economic instability, and even threats to public safety. In addition, data breaches can result in the loss of confidential information, financial losses, and reputational damage. Given the critical role of the energy sector in powering economies and societies, the potential impact of cyber attacks cannot be overstated.

So what are the main types of cyber threats the energy industry faces today?

Ransomware remains one of the most significant threats, with malware encrypting critical data and payment being demanded for decryption. This can cause huge levels of disruption to operations and lead to data loss if not swiftly mitigated.

Advanced Persistent Threats (APTs), which persistently attempt to breach networks to steal data or damage systems can also cause huge problems as can denial-of-service (DoS) attacks. These attacks aim to overwhelm systems with traffic, disrupting operations and causing service outages.

As in all industries, insider threats are also a major problem that can lead to compromised systems and data within the energy sector. Here, malicious actions or inadvertent mistakes made by insiders such as employees or contractors can lead to unauthorised access or data breaches, posing significant risks to operational integrity and confidentiality. Man-in-the-Middle (MitM) attacks are also becoming more prevalent with hackers intercepting and altering communications between parties to eavesdrop or manipulate data.

The rise of AI and machine learning is also adding a new dimension to these cyber security challenges. Such technologies are being used increasingly by cyber criminals to launch more sophisticated and adaptive attacks. AI-powered malware can autonomously identify vulnerabilities, evade detection mechanisms, and adapt strategies in real-time, making traditional cyber security defences less effective. AI is also being used to enhance the efficiency and precision of phishing and social engineering attacks.

Add to this the challenge created by vulnerabilities in OT infrastructure due to outdated systems and lack of patch management.

All of these types of attacks and vulnerabilities pose significant risks to the reliability, safety, and confidentiality of operations in the energy sector, which is why now, more than ever, organisations must give more focus and priority to their cyber security strategy.

This involves not only preventing and detecting attacks but also ensuring strong recovery and resilience strategies. Cyber security is one of the biggest risks posed to energy companies yet many don't even include it in their risk management processes.

Within this landscape, the implementation of advanced cyber security strategies like Managed Detection and Response (MDR) and Security Operations Centre (SOC) are essential for proactive threat detection and incident response. MDR provides continuous monitoring, threat detection, and incident response. By integrating advanced analytics and machine learning, MDR services can quickly identify and mitigate threats, reducing the potential damage caused by ransomware and other cyber attacks.

SOC enhances traditional SOC capabilities by incorporating automation and orchestration, improving response times, and ensuring a more proactive security posture.

Implementing foundational cybersecurity measures can also significantly enhance the protection of the energy sector's assets. These measures include robust asset management and keeping an updated inventory of all hardware and software assets to ensure comprehensive visibility and control. Deploying advanced anti-malware solutions and enforcing strict access controls to limit the spread of malicious software is also essential as is secure configuration and regularly updating patch known vulnerabilities.

Maintaining regular backups will help organisations to improve their resilience too, ensuring they have the ability to restore operations quickly in the event of an attack, minimising downtime and data loss. Developing and regularly updating an incident response plan to ensure quick and effective action when a cyber incident occurs is also an essential measure. Incident management is a critical part of any cyber defence strategy – breaches do and will happen – it's how effectively they are managed and responded to that will determine their impact on operations.

Cultivating an organisational culture, where cyber security is embraced and regarded as a collective responsibility is also a key prevention strategy. Encouraging a vigilant mindset amongst employees, where they are proactive in identifying and reporting potential security lapses is crucial. Regular cyber security training sessions should be implemented as part of this to help staff stay abreast of the evolving technological landscape.

Businesses are also being encouraged to pay close attention to their supply chain and the standards of cyber security provision adopted within it. With supply chain attacks on the rise, the energy sector must adopt rigorous security standards to protect against these threats. This involves vetting suppliers for cyber security practices and ensuring that all third-party interactions adhere to stringent security protocols.

To help foster a more resilient approach to cyber security, the UK government has been proactive in introducing a variety of regulatory frameworks and initiatives.

The UK's National Cyber Security Strategy outlines comprehensive measures to enhance cyber security across all sectors. Building resilience within organisations plays a key part, encouraging a culture of cyber security awareness to be fostered throughout businesses and ensuring top-level oversight of security practices within all organisations.

The Network and Information Systems (NIS2) Directive legislation has also been recently revised. This aims to improve the cyber security posture of critical infrastructure sectors, including energy. It mandates stricter security requirements for risk management, enhanced incident reporting protocols and supply chain security. NIS2 is applicable to all energy organisations – regardless of their size – and means that businesses must proactively assess and mitigate risks, promptly report incidents, and ensure the security of their entire supply chain. The framework is set to help organisations bolster resilience against evolving cyber threats, safeguarding vital energy infrastructure and operations.

With the very real possibility of causing huge problems across society, energy companies must start to place more focus on the prevention and management of cyber attacks. Adopting guidelines and legislation, integrating cyber security into organisational culture and effective monitoring and management will all help businesses to avoid devastating breaches and disruptions. Cyber security should be treated with the same seriousness as any other organisational threat – including financial risks or health and safety. By doing so, the industry can ensure the resilience and continuity of critical energy infrastructure, safeguarding operations and public trust alike.

Temi Akinlade is vCISO Security Advisor at Armor.

Spain: a European clean energy champion

Spain is a strong clean energy investment jurisdiction with abundant renewable resources and ambitious renewable energy targets. This is the latest in a series of country analyses where ***TEI Times*** looks at the country's generation and consumption profiles, policy, emissions targets and ability to attract the investment needed to meet government targets.

Spain has been a leader in renewable energy in Western Europe for the past decade, sometimes diverging from EU policies. It is a strong clean energy investment jurisdiction with abundant renewable resources, ambitious renewable energy targets, and several incentives. Investors include a great variety of domestic and foreign companies interested in solar, wind, and other renewable energy investments, as well as green hydrogen opportunities.

Commitments

Spain has been a leader in renewable energy and clean energy policies in Europe for the past decade. While its clean energy policies have generally aligned with those of the EU, there have been some areas where the country has taken a different approach or exceeded EU requirements. For example, Spain decided to scrap its Feed-in Tariff programme in 2013 due to a growing renewable energy tariff deficit. Instead, wind and solar energy producers were required to sell on the open market like other generators, receiving additional "fair" compensation based on their investment. Spain also decided to retain its nuclear power plants, planning to keep them operating until the end of their life cycle. Additionally, Spain's Climate Change and Energy Transition Law set a target of 100 per cent renewable energy by 2050, a goal that goes beyond the EU's net zero greenhouse gas (GHG) emissions by 2050 target.

Spain has experienced a significant drop in GHG emissions over the past decade, mainly due to a drastic change in its electric power sector driven by market forces such as high carbon prices and the increasing competitiveness of renewable energy. The European Union's binding Climate and Energy policy for 2030 and Spain's Integrated National Energy and Climate Plans have also played a role in setting targets and fostering emissions reductions. To accelerate the transition to net zero emissions, Spain should include more ambitious objectives in the Plans, in line with the targets adopted at the COP28 World Climate Action Summit.

Energy profile

Spain boasts a strong clean energy profile, which is expected to improve further by 2050. Fossil fuels accounted for less than 30 per cent of electric power generation, while renewables and hydro made up over 51 per cent and nuclear energy contributed 20 per cent in 2023.

Wind power was the largest contributor to clean energy generation, excluding nuclear, in 2022, accounting for over 52 per cent. Solar and hydro power made up 29 per cent and 19 per cent, respectively, based on International Energy Agency data. Over the past decade, Spain has steadily reduced its reliance on coal to under 2 per cent of the total mix in 2023, down from over a third. This shift has helped drive the nation's per capita emissions down to about half the global average and three times below their 2005 peak, according to energy think tank Ember. Spain currently aims to increase renewable energy to 78 per cent of electricity supply, including 81 GW in solar and 62 GW in wind power, and to reduce CO_2 emissions by 23 per cent from 1991 levels by 2030. The ultimate goal is to reach 100 per cent renewable energy by 2050.

Investment environment

Spain currently has a strong clean energy investment profile for both domestic and overseas investors *(see table)*. The nation's sovereign credit rating had been sharply cut by agencies to near non-investment grade (i.e., junk status) between June 2010 and June 2012 due to the global financial crisis of the late 2000s. However, it has since recovered, with Moody's rating it Baa1 (positive) – upper medium grade – and S&P rating it slightly higher at A (stable) – upper medium grade.

Spain ranks in the top quintile in terms of its innovation capability and renewable energy country attractiveness in the EY Index. It is also a good place to do business due to its lower corruption, high press freedom, and rule of law. It ranks in the top quintile in Transparency International's Global Corruption Perceptions Index, Reporters Without Borders' Press Freedom Index, and the World Justice Project Rule of Law Index.

Clean energy investors may face challenges similar to those in some of the neighbouring European countries, which the government is working to address. According to a June 2024 report by Global Energy Monitor, these challenges include improving the project approval process, as approvals for new solar projects can take as much as five years. The expansion of rooftop solar installations is also lagging due to a lack of awareness, financing limitations, or limited incentives for homeowners and businesses. Additionally, the existing grid infrastructure cannot support the increasing amount of variable renewable energy sources. Another challenge is the low spot prices, which were actually negative intraday for three hours on 1 April 2024 due to high renewable energy production and weak demand. This made April the cheapest month in the history of the domestic electric power market.

Investment policy

Spain boasts abundant renewable energy resources, with some of the best solar potential in Europe. A large part of the country falls within the range of 1600 to 1950 kW/m^2 – 700 and below is considered low, and over 1900 is very high. The government has been trying to motivate investment in clean energy for many years through various measures. These include decrees regarding access and connection to grid networks in 2020 and the development of procedures and requirements for granting administrative authorisation for closed distribution networks in 2023.

Additionally, Spain benefits from incentives from the EU as part of the REPowerEU Plan, which aims to save energy, diversify energy supplies, and produce clean energy. In October 2023, the EU updated its allocation to Spain, providing €80 billion and €83 billion ($87.2 and $90.5 billion) in EU Recovery and Resilience Facility grants and loans. Of this, 40 per cent is dedicated to supporting climate objectives, to be achieved by August 2026. Targeted spending includes €12 billion ($13.1 billion) for building energy efficiency and €13.2 billion ($14.4 billion) for sustainable mobility, including EV charging infrastructure. The allocation for the green transition has been raised to €67 billion ($73 billion) from €27.6 billion ($30.1 billion).

Jacobelli: The clean energy investment landscape in Spain is both deep and wide

Investors

The clean energy investment landscape in Spain is both deep and wide, comprising strong domestic companies and a variety of non-Spanish developers.

Those familiar with the renewables sector will recognise the names of local industry leaders such as multinational utilities Iberdrola and Acciona Energía, as well as energy company Repsol. Other notable players include EDP Renováveis, owned by Portugal's EDP, and Endesa, controlled by Italy' ENEL. There are also many other non-Spanish investors, such as French utilities EDF and Engie, Italian energy company ENI, and Norwegian utility Statkraft. Local and international private equity firms are also active.

These companies and many others are investing in solar and wind projects, but one area of particular interest to many investors is green hydrogen production. In 2024, the government announced a €2.3 billion ($2.5 billion) initiative to accelerate the country's energy transition, with a focus on subsidising green energy industries, including hydrogen produced from renewable sources. Spain aims to become a major producer of green hydrogen and recently approved a €794 million ($865.4 million) subsidy package for large green hydrogen projects. However, the success of green hydrogen projects heavily relies on subsidies due to the high costs associated with production.

The inclusion of agriculture, infrastructure, and rural areas in the green energy transition plan is noteworthy, but the lack of specific details makes it difficult to assess the potential impact fully. Nevertheless, Spain's ambitious target of 11 GW of electrolysers by 2030 aligns with global trends and sets a high bar for other nations.

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

RENEWABLES INVESTMENT PROFILE	RANK/RATING	YEAR	SOURCE
Business & Finance			
Moody's sovereign credit rating	Baa1 (positive)	2024	countryeconomy.com/ratings
S&P sovereign credit rating	A (stable)	2022	countryeconomy.com/ratings
Global Innovation Index	29/132	2023	wipo.int/global_innovation_index/
EY Renewable Energy Country Attractiveness Index	8/40	2023	ey.com
Other			
Global Corruption Perceptions Index	36/180	2023	transparency.org/
Reporters Without Borders Press Freedom Index	30/180	2024	rsf.org/en/index
World Justice Project Rule of Law Index	24/142	2023	worldjusticeproject.org/rule-of-law-index/

Spain currently has a strong clean energy investment profile for both domestic and overseas investors

A software approach to managing emissions

The energy industry faces the dual challenge of meeting surging demand while significantly reducing greenhouse gas emissions. GE Vernova's **Jacqueline Vinyard** explains how its new emissions management software solution can help companies address the modern complexities of managing their emissions.

While companies transition toward energy sources that emit less carbon and strive to meet net zero targets, the industry must adapt swiftly to remain competitive and sustainable. A critical component in this effort is more accurate measurement and reporting of emissions data.

Carbon emission management is not new for the energy sector, as companies have implemented reporting and reduction plans starting in the 1990s. Just as they have adopted Asset Performance Management (APM) software to help digitise operational excellence, many companies are now seeking out software to do the same when it comes to emissions reporting and management. Recent regulatory changes, however, are reshaping the landscape. For instance, the US Securities and Exchange Commission (SEC) passed a final rule mandating emissions reporting, requiring companies to disclose their environmental impact (currently stayed pending legal challenges).

Three key factors converge to drive urgency:

- *Soaring demand:* Predictions indicate a 50 per cent surge in electricity demand over the next two decades. Meeting this demand sustainably is paramount.
- *Net zero goals:* Energy companies worldwide are committing to achieving net zero emissions within the next 10 to 20 years. This ambitious target necessitates radical shifts.
- *Regulatory imperatives:* Mandatory reporting requirements challenge traditional manual processes. Manual processes are unable to provide fast and precise recommendations on where to improve emission reduction as well as the accuracy required for reporting.

A critical component in this effort is a more accurate measurement and reporting of emissions data. Improved data can help enhance the effectiveness of net zero strategies, maximise their impact, and track progress to reaching targets. When evaluating investments for emission reduction efforts, companies consider a multitude of factors for both short-term profitability and long-term reliability implications. A strategic approach that aligns with business impact becomes critical. But it's not just about making informed decisions; it's about implementing a holistic solution to help you get there. To make these decisions, traditionally siloed functions – such as sustainability, finance, and operations – must converge to fully address the carbon challenge.

So how can advancements in technology unlock opportunities to help reduce carbon footprints in the energy industry? Enter emissions management software using today's technology of artificial intelligence (AI) and machine learning, powered by digital twin technology. Employing an innovative technology approach to emissions management uses real-time and historical data and helps establish more accurate baselines.

This approach enables organisations to gauge the impact of their decarbonisation efforts and learn where to make investments aligned to their overarching net zero strategy. Furthermore, this also enables automation and data validation, which is key to reducing cumbersome and slow manual processes prone to errors. Adopting a more robust carbon emissions management solution may provide companies relief for the ever-changing regulatory requirements and help to avoid penalties.

GE Vernova released a new emissions management software solution engineered to help companies address the modern complexities of managing their emissions. CERius™ is engineered to automate more accurate greenhouse gas (GHG) data collection and suggest recommendations to operationalise carbon reduction efforts. The software offers abatement planning and what-if scenario analysis, team collaboration, and standardised reporting based on GHG protocols. Implementing cross-functional standards and processes fuelled by CERius can help position companies to address ever-evolving regulatory compliance.

"One of the most effective ways to drive emissions reduction in the energy and heavy industrial sectors is to pursue digital transformation," said, Linda Rae, General Manager, Power Generation & Oil and Gas, Electrification Software, GE Vernova. "While many energy industrials have been reporting emissions for years, the process is labour intensive, slow to surface insights, and based upon generic formulas. The energy transition demands agility, speed, and accuracy of data collection – CERius offers the fidelity of reporting emissions down to a specific asset, which can unleash actionable insights to help improve scope 1, 2, and 3 data accuracy and reporting, in addition to measuring abatement plans and optimise decarbonisation investment strategies," added Rae.

GE Vernova's expertise extends into developing CERius, which uses AI modelling and digital twin technology as a baseline to help better manage the complexities of emission management. This solution can help to manage emissions data, compliance, financial, and regulatory reporting, and strategic abatement planning. Advanced analytics provide insights directly drawn from historical, current plant, and enterprise-level processes.

There are two global energy leaders currently piloting CERius to help them manage their emissions reduction programmes.

Globeleq's Azito Energie S.A. ("Azito"), the largest gas power plant in Cote D'Ivoire, will be one of the first power plants to deploy CERius. The Azito power plant generates electricity using natural gas from the country's offshore gas fields. Located in the village of Azito in the district of Yopougon, approximately 6 km west of Abidjan, the facility uses combined cycle gas turbines that generate 713 MW of electricity. This equates to approximately 30 per cent of the country's base load generation.

Azito is a trailblazer in the digital energy space in Africa, serving as an example to other energy producers on the benefits of using digital solutions. By deploying CERius, Azito will be not just the first company in Africa, but a global early adopter to access this technology. Using a centralised solution, this technology is intended to enable better management of their emissions data, compliance reporting, improve processes, and strategic planning, further contributing to their net zero goals.

With greater access to better emissions data, Azito will be empowered to make more informed decisions on how to reduce carbon emissions.

Gionata Visconti, Chief Operating Officer of Globeleq, said: "As a Group that has a mixed portfolio of power plants across Africa and is fully committed to the energy transition, it is vital that we are able to monitor and report our emissions from one of our key thermal plants in a timely and accurate manner. At the same time, we can use the information from CERius to help reduce and abate our emissions. Critically, Azito is an essential part of Cote d'Ivoire's energy infrastructure, and we will now be able to make important planning decisions with better and more insightful data."

In 2018, Xcel Energy became the first utility in the United States to set a net zero goal for 2050. This net zero initiative includes a comprehensive strategy to reduce greenhouse gas emissions and promote sustainability across its enterprise. For years, Xcel Energy has measured and reported emissions data. Xcel Energy is a major regulated electric and natural gas delivery company that serves approximately 3.7 million electricity customers and 2.1 million natural gas customers across the Midwestern and Western United States. Xcel Energy is participating with GE Vernova's CERius pilot programme at three generation facilities: Cherokee Generating Station, Fort Lupton Power Station, and Pawnee Generating Station.

"I'm eager to see the speed to insights and precision in reporting we're expecting with this pilot programme, which can help us more quickly understand opportunities and strategise for emissions reduction," said Jeff West, Senior Director, Environmental Services, Xcel Energy

With the help of CERius, Xcel Energy is working to achieve the following outcomes:

- *Increased greenhouse gas (GHG) emissions visibility:* Contextualised views of emissions at the asset- and site-level, offering deeper insights into GHG emissions.
- *Decarbonisation planning & strategy:* Abatement planning and projections data, carbon reduction management, and baseline strategy for decarbonisation.
- *Automated Scope 1 data collection:* Data aggregation automation will be confirmed for three key plants participating in the pilot.
- *Increased accuracy in Scope 1 data accounting*: By validating current emissions data collection against CERius' automated calculations, Xcel Energy aims to demonstrate improved accuracy for monitored assets, including natural gas combined cycle and simple cycle turbines. Historical data provided by Xcel Energy will serve as the benchmark for validation.
- *Improved data collection process:* The pilot will validate that manual data collection efforts have been notably improved through automation.

Improved emissions data is a cornerstone of the global effort to decarbonise. For heavy industrials and the energy industry, precise tracking, monitoring, and more accurately measuring emissions data is indispensable for effectively reaching carbon neutral commitments. By implementing better efficiencies, processes and a more collaborative solution, companies can make significant strides towards net zero. As these industries continue to play a critical role in the global economy, their ability to leverage more accurate data for decarbonisation will be key to address climate uncertainty and aim to provide more sustainable and available energy.

A centralised emissions management solution can help kick-start or enhance a company's path toward carbon neutrality, regardless of starting point. CERius is positioned to be the carbon accounting system of record using validated emissions data enabling energy companies with a powerful tool engineered to make the biggest impact – more accurate measurements, manage to target, and unlock meaningful investment strategies. Implementing an efficient approach to emissions management – through data automation, deeper visibility, and precision into carbon intensity – liberates valuable team members to channel efforts into effective decarbonisation actions.

Better data is the foundation to drive business results:

- *Operational efficiency:* Accurate emissions data helps companies identify inefficiencies and reduce carbon emissions. Optimising operations not only cuts emissions, but also lowers costs.
- *Regulatory compliance:* Precise emissions data ensure compliance with environmental regulations, avoiding fines and legal challenges.
- *Investment decisions:* Trustworthy emissions data guide investments in decarbonisation, prioritising effective strategies.
- *Stakeholder engagement:* Transparent emissions reporting builds trust and accountability with stakeholders.
- *Driving innovation and competitive advantage:* Accurate emissions data drive innovation and competitive advantage. The data inform technology development, influence brand reputation, and respond to consumer demand for sustainable products. Early adopters can benefit as low-carbon options become more competitive.

Jacqueline Vinyard is Product Marketing Director for GE Vernova's Power & Energy Resources Software business.

Vinyard: Precise tracking, monitoring, and more accurately measuring emissions data is indispensable for heavy industrials and the energy industry

Junior Isles

Greening and growing

With a recent move out of London, I'm experiencing my own form of 'greening'. It seems there is no escaping the green transition. Recently DNV presented an outlook explaining how electrification using green energy sources is transforming the energy market.

In its 'Energy Transition Outlook: New Power Systems' DNV forecasts the global energy future to 2050, with 'new power systems' defined as electricity systems where most of the power is generated from solar and wind.

Last year, solar and wind supplied as much as 63 per cent of Denmark's electricity and DNV anticipates that what is happening in Denmark will be repeated in most countries around the world in the next 25 years. Initially driven by the need to curb carbon emissions and more recently by energy security electricity generated from renewables is now at the heart of most government energy plans. But electricity is not just greening; it is also growing.

According to the report, electrification will result in a doubling of electricity use by 2050 compared with today. "Electricity is without doubt the engine of the decarbonisation the world needs," said Remi Eriksen, Group President and CEO, DNV. He noted, however, that it is a "complicated and challenging" engine.

"The grids need to expand vastly; there must be a lot more storage to cope with the variability of solar and wind; demand must be managed more flexibly; and the success of all of this depends on a deep digital transformation in the industry including investment in artificial intelligence."

But the world urgently needs to come to terms with what 'new power systems' mean in reality. These systems need careful planning and joined up action by many actors – all facilitated and supported by massive digitalisation. Crucially, the public also needs to embrace the change and see why it is in its interest.

This has led DNV to issue the detailed report, which looks much deeper into power systems than it has in seven years of publishing its Energy Transition Outlooks.

The forecast is what the company sees as the most likely future, taking into account current and expected policies, and is built on a system dynamics model of energy use and trade within and between 10 global regions.

Notably, DNV's most likely future does not result in net zero by 2050 or achieve the Paris Agreement target of limiting global temperature rise to 1.5°C. Instead, it predicts a rise of 2.2°C by the end of the century.

Electrification will be responsible for more than 80 per cent of all emissions reduction between now and 2050. By mid-century, the report forecasts that more than 90 per cent of all vehicles on the road, globally, will be electric and heat pumps will be ubiquitous. This will result in a nearly doubling of global electricity demand. In 2022, electricity represented 20 per cent of world final energy use. By 2050 this will be 37 per cent.

"When you consider how inefficient fossil fuel systems are – with most of the primary energy lost as heat – it stands to reason that electricity will supply most of the useful energy the world will be using by mid-century, said Ditlev Engel CEO for Energy Systems at DNV.

At the same time, electricity will be greening. According to DNV, last year the share of wind and solar in electricity generated was 13 per cent. By 2040, those two sources will be responsible for 50 per cent of electricity generation, moving rapidly to 70 per cent by 2050. In 2050, 82 per cent of all electricity will come from renewable sources – i.e. hydropower, geothermal, and biomass in addition to solar and wind.

The changes will play out differently across the world's regions. For example, wind and solar supplied 24 per cent of Europe's power last year. That share will climb to 50 per cent by 2033, and just over 75 per cent by 2050. In the US, the share increases from 16 per cent in 2023 to 80 per cent in 2050. Meanwhile, the share of wind and solar in China grows from just 13 per cent last year to 75 per cent in 2050.

"We are looking at a nine-fold growth in wind and solar in the next 25 years. That in itself is mind blowing," said Engel. "But we need to understand what that means to the power system as a whole, and the wider energy system."

Notably, there is a massive growth of solar and solar co-located with storage, which together provide about 40 per cent of the world's power by 2050. Around 30 per cent will come from wind. Further, DNV's forecast shows the flexibility market will double over the next 25 years, with utility-scale lithium-ion batteries accounting for well over half of the required flexibility.

In terms of technology, the other key aspect of the new power system will be the impact on grids.

"The mantra repeated at COP28, was there will be no transition without transmission," said Engel. "We forecast that global grid transmission and distribution combined will double in length from 100 million circuit kilometres in 2022, to 200 million km in 2050… the same grid will grow 2.5 times in capacity globally."

With the current backlog of projects waiting for grid connections and the time needed to permit and build new lines, the report also takes a deep dive into grid enhancing technologies such as dynamic line rating and re-conductoring, which hold the potential to lift capacity on existing grids by anything between 10 and 50 per cent.

The massive change is seeing governments make the necessary policy changes, especially Europe – not only to drive down emissions by embracing renewables and batteries, but also to improve energy security while boosting domestic industry.

The UK is a good example. In late July, the newly elected Labour government introduced Great British Energy – a publicly-owned energy company, designed to drive clean energy deployment, boost energy independence, create jobs and "ensure UK taxpayers, billpayers and communities reap the benefits of clean, secure, home-grown energy". Setting up Great British Energy is one of government's first steps for change.

In its first big announcement, new Prime Minister Sir Keir Starmer said British seabed owned by the Crown Estate will be used to help build wind farms in plans aimed at making the UK more self reliant for energy.

The firm's aim is increase renewable energy projects, boosted by state funding, paid for by a windfall tax on oil and gas giants. The government is providing GB Energy with £8.3 billion of funding but hopes to attract £60 billion of private investment.

The deal means the Crown Estate – which manages a huge portfolio of property and land and helps fund the Royal Family – will lease the land on which wind farms can be developed and built.

Energy Secretary Ed Miliband said GB Energy would eventually lead to lower bills, but warned "it's not going to happen overnight". As renewable energy projects "start coming online we'll start to see the effect on bills. We are going as fast as we can", he told *BBC Breakfast*.

The aim is to get wind farm projects that could generate between 20 GW and 30 GW of offshore power to lease stage by 2030. The Crown Estate already had this as a target, but the government has now confirmed it would help. The government also believes it can cut the time it takes to get wind farms producing power by half. It typically takes between 10 and 15 years to build offshore wind farms.

Labour also hopes that GB Energy, a key manifesto pledge, will reduce UK "over-reliance" on fossil fuel markets, where soaring gas prices led to spiralling electricity prices after Russia's invasion of Ukraine.

Commenting on the announcement of a new partnership between GB Energy and The Crown Estate, Jess Ralston, Head of Energy at the Energy & Climate Intelligence Unit (ECIU), said: "GB Energy certainly has the potential to deliver on making us more energy independent and moves to help with community engagement and planning, which has been holding back growth."

Growth is always welcome. Almost always. When that growth is green the benefits are myriad. But I hope my move to a greener part of the country brings a more relaxed life is not one that leads to growth in my waistline.

Cartoon by Jem Soar