



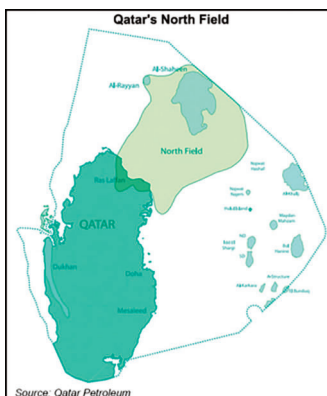
Qatar expedites LNG expansion at time of pre-FID delays elsewhere

QatarEnergy's move to proceed with the 16 mtpa North Field West project is intended to reassure buyers that while there are uncertainties and delays in other pre-FID projects – Qatar has the volumes. Japan's largest LNG importer and power generator JERA and the German utilities Uniper and SEFE had warned the US pause on LNG export permits could undermine the world's energy security.

Though the US Department of Energy (DOE) claims only four projects with pending export approvals are directly affected by President Biden's order to pause in decisions on LNG exports to countries that the US does not have a Free Trade Agreement with (non-FTA), analysts warned it also affects many projects which aim for first LNG exports before 2027.

Currently, almost 90 mtpa of planned liquefaction and export capacity need non-FTA approval – and without such permit, projects would struggle to sign on sufficient firm offtake to secure debt financing and reach financial close.

Reacting quickly to perceived risks of future supply shortages, QatarEnergy is expediting its giant North Field development which holds a massive scale of gas reserves. Appraisal drilling and studies have increased recoverable gas estimates from 240 trillion cubic feet to over 2,000 tcf, while corresponding condensate volumes



were revised up from 70 billion barrels to over 80 billion bbl.

"The timing is fortuitous – the Biden administration has paused US LNG export approvals, Russian LNG is sanctioned and civil unrest continues in Mozambique. As other major LNG competitors stall, QatarEnergy continues to expand its capacity at pace," said Fraser Carson, Wood Mackenzie's research analyst of Global LNG.

The North Field West LNG is designed to have 16 mtpa, likely from a pair of 8 mtpa mega trains, as utilised in the recent North Field South expansion. Once fully ramped up, the new liquefaction plant will take Qatar's overall LNG production capacity to 142 mtpa.

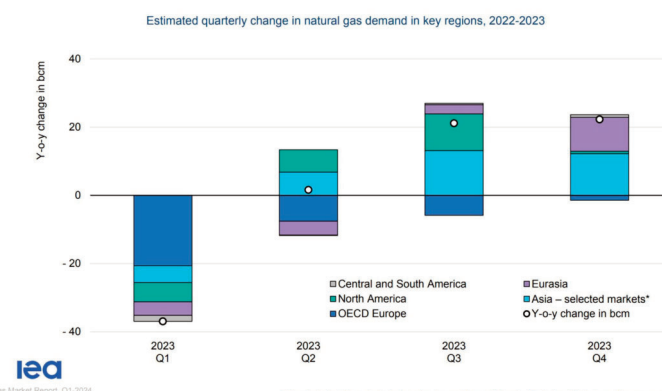
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Higher gas-burn in Asia and US partly offset by lower demand in Europe

Lower gas prices have pushed up gas use in the US power sector to an all-time high while China and India spur a demand rebound in Asia – though growth is capped by a limited rise in LNG supply, the International Energy Agency (IEA) finds. In 2024, global gas demand could expand by 2.5%, or 100 bcm – driven by Asia – while gas-burn in Europe falls further.

Strengthening industrial activity and the power sector were the key drivers behind gas demand growth in 2023: In the United States, gas-burn for generating electricity reached an all-time high of 42%, supported by low prices, as domestic gas output rose by 4% to an all-time high of 1,065 bcm. Ample domestic gas supply also allowed US exporters to step up LNG shipments by 10%, though permitting and

Gas demand returned to growth across all key markets in H2 2023, except Europe



* Bangladesh, China, India, Indonesia, Japan, Korea, Malaysia, Pakistan, Philippines, Singapore and Thailand.

build-out of key liquefaction capacity is now on hold.

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With global gas demand forecast to grow by 13.5%, or more than 500 billion cubic metres between 2023 and 2033, spurred primarily by Asian demand – Qatar is keen to show it can deliver.

China and India spur a demand rebound, though growth is capped by a limited rise in LNG supply, the International Energy Agency (IEA) finds: China's demand jumped

by 7% or 26 bcm last year on the back of higher gas use from power generators and industry which pushed up LNG inflows by a substantial 14%, or 12 bcm – though the IEA pointed out this is still below 2021-highs. India's gas consumption recovered as well while demand in the region's mature markets, Japan and South Korea, fell amid improving availability of nuclear power sta-

tions and lower overall electricity use.

"QatarEnergy is incentivised to make sure its gas remains affordable to emerging LNG buyers to entrench the role of gas and LNG in these economies," Carson noted, pointing at Qatar's advantaged geographical location for meeting long-term demand growth in South and South East Asia, while still delivering into Europe when required. ■

ESG successfully test water removal system to enhance CO2 capture

ESG Clean Energy's water removal system has achieved over 90% efficiency in capturing carbon from emissions incurred from power generation during tests in Holyoke, Massachusetts. The exhaust stream of a 4 MW gas-fired power plant was cooled and fed through a ceramic membrane to remove water vapor before capturing carbon, making mitigation more efficient.

Water gets in the exhaust stream as it is actually a by-product of combustion. But these water molecules negatively affect mitigation efforts. A study by ETH Zurich and Stanford University found that "in all carbon capture processes the feed steam contains water vapor, which interferes with the mechanisms involved in the adsorption of CO₂."

Traditional CCS systems struggle to separate the CO₂ from a mixture of nitrogen, oxygen, carbon monoxide and water vapor. Some substances have been developed that can selectively attach or react with the CO₂ and let other gases pass by, but the water vapor remains which negatively affects the carbon capture process.

ESG hence removes the water vapor from the exhaust before capturing carbon.

To that end, a ceramic membrane that has been incorporated into a unique mechanical cooling system. Tests at Holyoke reached over 90% efficiency in removing water vapour from the power plant's exhaust, outperforming the anticipated 83% rate.

"We knew our design was solid, but we were not expecting to reach this level of efficiency so quickly," said Nick Scuderi, president of ESG Clean Energy. "And given that we have yet to fully optimize our design, we believe the efficiency will be even higher."

Plans for a second gas-fired power plant in Holyoke are also being advanced. That 4.2 MW plant would also run on Caterpillar engines and could be used for further tests as ESG strives to scale up its water removal technology to meet the carbon mitigation



Test plant at Holyoke, powered by Caterpillar gas engines

needs of small and large power generators, and eventually the transportation industry.

The exhaust treatment system can be retrofitted onto current operating power plants, the developer said. In fact, ESG has licensed the technology to Camber Energy for use in all of Canada and multiple locations in the United States. ■

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Over in Asia Pacific, overall gas demand rebounded by an estimated 2.5% as re-

gional powerhouses recover from the pandemic and subsequent economic decline. China's gas demand, for once, jumped by 7% or 26 bcm last year on the back of higher gas use from power generators and industry which pushed up LNG inflows by a substantial 14%, or 12 bcm – though analysts pointed out this is still below 2021-highs. India's gas consumption recovered as well while demand in the region's mature markets, Japan and South Korea, fell amid improving availability of nuclear power stations and lower overall electricity use.

Slump in Europe's gas-burn

Expanding demand in North America and Asia was, however, partly offset OECD Europe where gas demand fell by 7% (or 35 bcm) in 2023 to its lowest level since 1995. The power sector alone accounted for a massive 75% of the demand drop as lower

electricity consumption together with renewables expansion and improving nuclear availability weighed on gas-fired power generation.

Industrial gas demand started to recover in the second half of 2023, albeit slowly, and still remains well below its pre-pandemic level. LNG shipments to Europe declined marginally – following a 60% surge in 2022 – as lower demand and high storage levels reduced buyers' need to snap up often high-priced LNG cargoes starting from last summer.

Looking ahead, IEA analysts expect European gas demand to grow by 3% this year but remain nearly 20% below its 2021-levels. Though industrial gas use is set to recover eventually, the use of gas-fired power generation will keep falling as renewables paired with energy storage become increasingly cost competitive. ■

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UK energy infrastructure CAPEX needs to rise to £38 bn/y to achieve 2050 goals

The British government needs to create an investable marketplace to prevent the energy transition from stalling, DNV says, forecasting an increase in annual energy infrastructure spending from £26 billion to around £38 billion over the next 30 years. While this rise is significant in absolute terms, the energy CAPEX remains stable at about 1% of GDP though 2050, researchers stressed.

To make financiers come forward, the government must prioritize long-term policy clarity and consistency – especially since the transition is stalling and the country not on track to meet either its legally binding 2050 decarbonization targets, DNV states in its UK Energy Transition Outlook.

The UK's annual emissions are forecast to amount to some 125 million tonnes of carbon dioxide equivalent (MtCO₂e) in 2050. "Though this is a significant 85% reduction relative to 1990 levels, it is not the 100% reduction by mid-century that the UK has legislated for," Hari Vamadevan, DNV's regional director for energy systems, UK & Ireland said when discussing the outlook in London at a panel with executives from SSE Thermal, Octopus Energy, the government's Climate Change Committee and various environmental groups.

With the right incentives, the transition can still be accelerated, DNV reckons, notably through swift deployment of wind, solar PV, smart grids, electric vehicles – but also miti-

gating technologies as CCS and hydrogen.

The hydrogen market is in particular need of significant support: The report outlines that by 2030, hydrogen production will reach 1 million tonnes per year, only 60% of which will be low carbon, equivalent to roughly 5 GW of low carbon hydrogen versus the government target of 10 GW.

Buildout of green generation and grids

On the supply side, clear incentives are needed to crowd in private capital for buildout of green generation and ease planning and permitting for the delivery of critical grid infrastructure. At the same time, government needs to engage with society to embed low carbon solutions and ensure a "just transition" whereby downside social impacts are minimised.

Today, close to 80% of all UK primary energy comes from fossil fuels, of which just over 50% is produced nationally, with renewables (13%) and nuclear energy (7%) covering the remaining share. Even with the

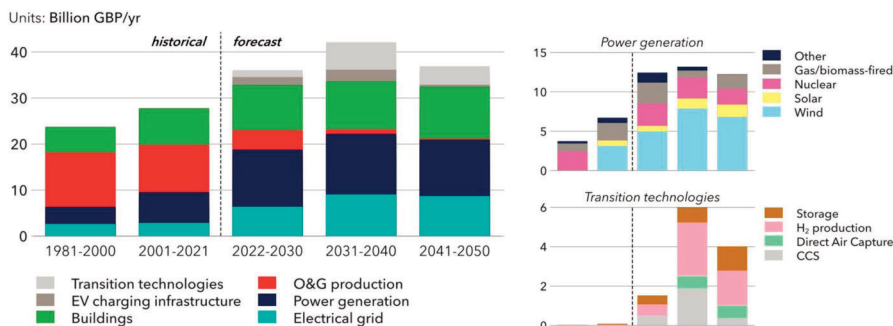
expected build-out of renewables, this heavy reliance on fossil fuels will remain for the next decade, only reducing to 70% by 2031.

To make low-carbon supply sources meeting nearly 65% of the UK energy needs by 2050, it needs a step-change in historical power grid investment levels, Vamadevan stressed, noting: "This will require an overhaul of the way networks are planned, built, and operated."

Cheaper energy for consumers

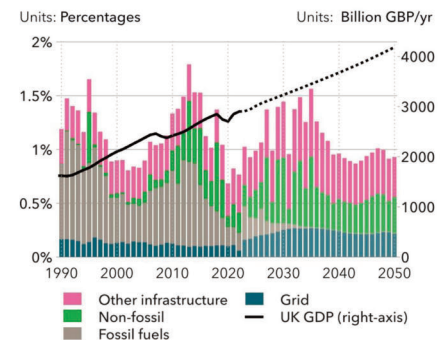
But despite substantial CAPEX requirement and regulatory support to accelerate the green energy transition, DNV is convinced there will be "big wins" for the British public: "Domestic consumers will benefit from an almost 40% reduction in household energy costs by 2050, when compared with 2021 prices," he said, concluding that decarbonising the UK economy is affordable given that a substantial green prize awaiting is households in the form of cleaner, more efficient and less expensive energy. ■

Average annual energy system CAPEX spend



DNV Energy Transition Outlook UK 2024

Energy system CAPEX as a percentage of UK GDP



Courting energy tech investors as price pressure eases

As Germany's economic recovery drags its feet – despite easing energy prices – the government is courting investors in green technologies to come forward. Industry electricity prices plunged in early 2024, with small and medium-sized companies paying €17.65 cents per kilowatt-hour in new contracts – a 28% drop compared to pre-year averages, but the mood is still downbeat.

Though price indicators continue to point downward, analysis by the Federation of German Energy and Water Industries (BDEW) shows, this positive trend is

not yet reflected in industry sentiment. Economist and advisor to the economy ministry Jens Südekum called the results of BDEW's analysis "astonishing," but cautioned the impact of lower price will only be more widespread in new industry electricity and gas contracts, once the current ones expire.

The rebound of the German economy from the coronavirus pandemic and the energy crisis is painfully slow: "We're leaving the crisis slower than we were hoping," energy minister Robert Habeck com-

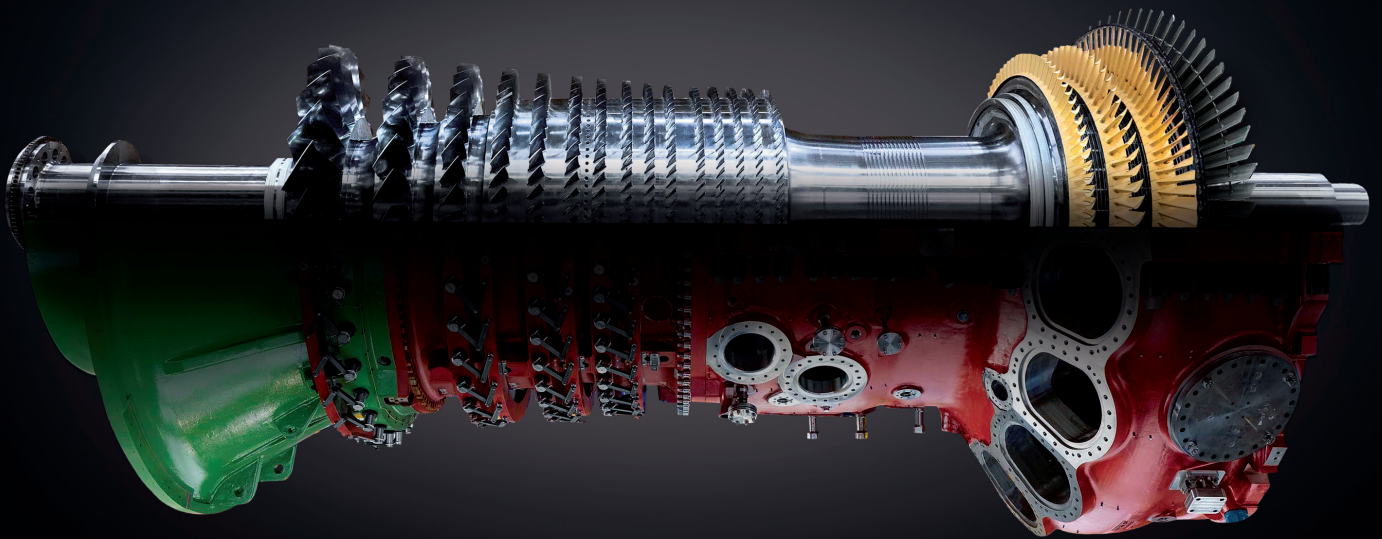
mented after the government adjusted its economic growth forecast from 1.3% down to 0.2% this year.

The energy crisis, ensuing Russia's invasion of Ukraine and subsequent halt in gas deliveries to Europe in retaliation to Western sanction, has hit Germany's energy-intensive industry hard: Economic researchers at the IW institute found the string of crisis over the past four years had incurred €545 billion for the German economy, with energy-intensive industry suffering a €155 billion shortfall in investment. ■

— ITALIAN ENERGY —

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Uniper's reverses losses, prepares to start repaying state bailout

German utility Uniper has swung back to a €6.37 billion (\$6.8bn) operating profit in 2023, benefitting from hedges for electricity generated from coal and gas and in its gas midstream business. Having reversed its 2022 loss, Uniper promised to set aside €2.3 billion to pay back the billions it received from the taxpayer as part of a bailout during Europe's energy crisis.

Hedging transactions to cover the company's open gas supply obligations, which resulted from the reduction in gas deliveries from Russia, also had a positive impact on earnings, the Düsseldorf-based utility disclosed. At the same time, Uniper's thermal power plants generated roughly 13% less electricity last year than in the prior year, given the utility some room to sell the spare fuel at a profit while having to pay less for emission credits.

Net cash position allows to repay debt

CFO Jutta Dönges called earnings "literally extraordinary" as Uniper adjusted net income, which largely tracks EBIT, amounted to €4,432 million in the 2023 financial year – substantially above the prior-year figure of -€7,401 million. High operating cash flow of €6,549 million gave Uniper a net cash position of €3,058 million – allowing it to make provisions for repaying its debt obligations to the German state.

During Europe's energy crisis in 2022, Uniper amassed losses when it had to substitute Gazprom's halted deliveries in contractual Russian gas supplies with more expensive spot deliveries, often in the form of LNG. The German government came to rescue with a €13.5 billion bailout which

gave the state a 99.12% stake in the company. The European commission approved the bailout but required Uniper to divest certain assets, notably its ship-fuel trading business in the UAE, its 20% stake in the BBL pipeline and the Gönyü gas power plant in Hungary. In addition, Uniper initiated the disposal of its electricity business in North America.

Having implemented the Commission's remedies, Uniper can today prepare to repay that debt as "no more additional costs for gas replacement procurement were incurred in the first nine month of last year. Instead, the utility reaped a €2 billion profit before taxes after the company's gas wholesale price projections turned out to be overly pessimistic.

Lower earnings likely in 2024

Looking ahead, the CFO does not expect that to see earnings figures in the magnitude as last year in the foreseeable future. Adjusted EBITDA is anticipated to be "significantly below the 2023 level," ranging between €1.5 and €2 billion. Adjusted net income is likewise expected to be substan-



tially below last year's level and in a range of €0.7 to €1.1 billion.

Having regained financial stability in a short time, Uniper CEO Michael Lewis now focusses on implementing the company's new focus on green and flexible generation and less carbon-intensive fuels. "We'll invest about €8 billion in Uniper's green transformation," he vowed, specifying: We recently agreed to a partnership with Siemens Energy on the possible construction of hydrogen-ready power plants that secure the energy supply during dark doldrums."

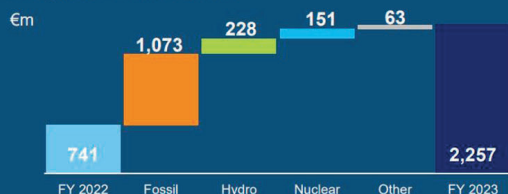
Irsching 6, a new open-cycle gas power plant near Ingolstadt, was commissioned in early August. The 300 MW plant serves exclusively as a security buffer and is dispatched only if called upon by the grid operator TenneT. Advancing the coal exit, Uniper will permanently decommission

Heyden 4 hard coal-fired power plant in Petershagen near Minden on September 30, 2024.

Alongside decarbonization and renewables expansion, flexible power generation will play an important role to make the energy transition feasible. Lewis hence welcomed that the coalition government finally agreed on its power plant strategy and plans to set up a capacity mechanism in Germany from 2028.

Adjusted EBIT – Development by sub-segment

European Generation



- Fossil:** Exceptionally high earnings contribution due to successful hedging transactions; temporary return of Heyden 4 hard coal power plant to commercial operation; absence of previously imposed government generation restrictions for the Maasvlakte power plant
- Hydro:** Positive price effects; lower price distortions between the system price and the Swedish price zones
- Nuclear:** Mainly positive effects from realized prices

Global Commodities



- Gas:** Increase mainly attributable to the absence of losses from replacement procurement costs (FY 2023: €2.3bn of cumulative reduction in costs, FY 2022: €13.2bn of incurred losses), partially offset by a lower but still excellent result from portfolio optimization
- International/Other:** Increase mainly attributable to successful LNG trading activities
- Power:** Lower result in the electricity trading business after last year's record contribution

EU approves €4 billion German state aid to decarbonise industries

The European Commission has approved, under EU state aid rules, a €4 billion German scheme to decarbonise industrial production processes. Support would be given through two-way carbon contracts for difference (CCfDs) which compensate manufacturers in the chemistry, metal, glass or paper for electrifying production processes or switching to hydrogen-powered plants.

The CCfDs scheme will be partly funded through the contested Recovery and Resilience Facility (RRF), a temporary instrument to raise financing by issuing bonds. To be eligible, projects will need to achieve a 60% emission reduction in three years and a 90% emission reduction in 15 years compared to the best available conventional technologies. Selected companies will be compensated for the additional costs of switching to climate-neutral production procedure.

In a first call for tenders, the German government wants to make available \$4 billion. The proceeds will not be paid in one lump sum, but in instalments over the fixed 15-year term of climate protection contracts. A maximum of €1 billion per application will be paid to encourage smaller and medium-sized projects.

In total, the German economy ministry



Steelmakers call for a quick launch of the first CCfD tender

plans to conjure up more than €20 billion for climate protection contracts in four tenders rounds. Projects based on carbon capture and storage (CCS) cannot participate in the auctions, initially, given that Germany still lacks rules for the technology. Industry keeps waiting for the government to present its carbon management strategy which will specify pathways for CCS and direct air capture. ■

Germany supports CCS for industry to become carbon neutral by 2045

The German government plans to support carbon capture and storage for hard-to-abate emissions from industry and gas-fired power generators. "CCS technology is only a pragmatic addition to our climate policy," energy minister Robert Habeck said, yet there are unavoidable emissions for producing concrete or lime which need to be sequestered and stored to reach the country's climate targets.

Germany aims to become climate neutral by 2045, "a very ambitious goal" as the ministry conceded. Considering some industrial emissions cannot be avoided, the government now wants to incentivise or partially fund CCS retrofits, a draft on the upcoming Carbon Management Strategy reads. Same goes for post-combustion CCS for gas-fired power plant, albeit without state support.

Captured carbon is meant to be stored in aquifers under the seabed, or allow upstream companies inject it into depleting reservoirs for enhance oil and gas recovery. Heidelberg Materials, for instance, is implementing the world's first system for CO₂ capture and storage (CCS) on an industrial scale in a cement plant in Brevik, Norway.

Though carbon capture, storage and utilisation is gaining traction in Scandinavia, the UK and North America, regulation in Germany so far made make large-scale transport and carbon storage practically impossible. But since "time has run out" to reach climate targets, all German parties are re-aligning their stance on CCS.

The industry association BDI welcomed the government's promised support schemes, especially their focus on applications in industry and waste management, while environmentalists dismissed as they could throw a lifeline to old fossil-fuelled business models. Other green groups, meanwhile, deem CCS for gas-fuelled electricity generation "acceptable" – if all emissions along the value chain are priced correctly. ■

UK energy bills to fall sharply as Ofgem slashes price cap from April

The UK energy regulator Ofgem has announced the new energy price cap will be 12.3% lower than the current level of prices, meaning the average household bill will be £1,690 a year. Falling wholesale prices paid by suppliers mean there should be some relief for consumers when a new, lower price cap takes effect in April.

The price cap limits the amount that can be charged for each unit of gas and electricity – not the total bill. The new cap, effective from 1 April to 30 June 2024, will reduce the price of energy for a typical household in England and Wales will be £238 per year lower than the price cap set in the previous three months.

Consumers on a standard variable tariff will pay on average 24.50 pence per kilowatt

hour (kWh) for their electricity and 6.04 pence per kilowatt hour (kWh) for their gas.

Limitations of the current system

Ofgem CEO Jonathan Brearley called it "good news to see the price cap drop to its lowest level in more than two years," but he stressed the need to address the "risk posed by stubbornly high levels of debt in the system." The act of capping prices has stirred up a debate about the merits of subsidising energy in the face of persistently high inflation in Britain.

Pointing at limitations of the current system – "we can only move costs around" – Brearley welcomed the government seeking view on how standard energy deals can be made more flexible so customers pay less if using electricity when prices are lower. ■



Equinor one step closer to 1.8 GW low-carbon H2 production at Saltend

With the latest planning consent for H2H Salted (600 MW), Equinor is getting closer to delivering 1.8 GW of low carbon hydrogen production in the Humber region, nearly 20% of the UK's national 2030 target. The hydrogen, produced with carbon capture at H2H Saltend, will be blended with natural gas for co-firing at SSE Thermal's on-site power station.

SSE Thermal and Equinor acquired Triton Power in 2022 to get hold of Saltend Power Station with an installed capacity of 1.2 GW. The plant is powered by a conventional combined cycle gas turbine (CCGT) that uses natural gas but the new owners prepare the plant to co-fire up to 30% hydrogen from 2027.

The hydrogen is meant come from Equinor's H2H Saltend hydrogen project, designed reform natural gas into hydrogen by carbon capture and storage, mitigating more than 95% of its CO2 content. With the purchase of Triton's CCGT subsequent conversion, Equinor and SSE are creating an anchor customer to underpin utility-scale hydrogen production for power generation but also industrial use.

Situated at the energy intensive Saltend Chemicals Park, to the east of Hull, H2H Saltend is meant to help reduce the park's emissions by up to one third. To that end, hydrogen will be used in chemical processes and directly replace gas in several onsite

heat and power stations. Equinor reckons the amount of CO2 captured and safely stored in sub-sea aquifers as a result will be around nearly 900,000 tonnes per year, equivalent to taking about 500,000 cars off the road annually.

£20 billion in gov' support

Britain's green finance minister Lord Callanan singled out CCUS clusters – like the one emerging around Saltend – as the starting point for a new industry in the UK. "This is why we've committed up to £20 billion in early support," he noted, "and expect to bring forward 4 GW of low carbon hydrogen production by 2030."

Regional CO2 pipelines in the Humber region, running from Easington in East Yorkshire across northern Lincolnshire and to Drax in North Yorkshire, will capture and transport carbon dioxide for safe sub-sea storage. Three projects along this pipeline route – H2H Saltend, Drax BECCS and Keadby Carbon Capture Power Station – now



Bird eye's view of Saltend Chemical Park

have planning consent, making the region a frontrunner for decarbonisation through hydrogen. ■

Works on Marchbach OCGT behind schedule, start-up date unclear

Delays in the construction EnBW's grid stabilisation plant in Marbach, north of Stuttgart, are more far-reaching than expected. The future operator of the 300 MW open-cycle plant, to be powered by an AE94.3A gas turbine, claims it is unable to specify a start-up date, while Uniper's Ansaldo-built reserve power plant at Irsching is readily available.

Both OCGTs are built with the sole purpose of stabilising the power network and are hence only dispatched on request of the grid operator. The Irsching 6 reserve plant, built Ansaldo Energia, already allows operator Uniper to stabilise the Bavarian power grid if requested by the TSO TenneT. Synchronisation of the plant to the 380 kV grid in Germany occurred in early May last year, followed by the first firing of the gas turbine and the commissioning of the entire plant.

Ansaldo Energia had built the Irsching open-cycle plant under a turnkey EPC contract and is now helping Energie Baden-Württemberg (EnBW) to realise the similar-sized OCGT Marbach 4. Though there is a lot of activity on the construction site, with the buildings, facilities and even the chimney clearly visible – EnBW noted the project has not yet progressed as far as originally planned.

Over 16 months delayed

Worldwide delivery difficulties, material shortages, factory closures and staff shortages have led to delays in construction work," EnBW said, conceding that "despite additional staff and parallel work, the set construction schedule will not be met." Completion was originally scheduled for October 2022, but even at the start of 2024 EnBW was unable to specify a revised start-up date.

The regional utility was, however, quick to point out the delay "has no impact on the assessment of security of supply."

Given that the Marbach OCGT was not intended to replace power plant output that might fail it is deemed less critical. EnBW suggested the plant would "only be used on request of the TSO TransnetBW in situations in which equipment in the transmission network, such as transformers, substations or parts of the network, fails and a critical condition arises in the power network." ■

India's PGCIL orders shunt reactors from GE

Power Grid Corporation of India Ltd (PGCIL) has awarded a multi-million dollars order to GE for the supply of 765 kV Shunt Reactors to help integrate large-scale renewable energy source and enhance transmission in regions like Rajasthan and Karnataka. India aims to generate half of its electricity from non-fossil sources by 2030, compared to 41% currently.

The Indian government has set a target to have 500 GW of non-fossil power generation capacity installed by 2030, which needs to be connected to the grid without distorting the supply/demand balance.

Shunt reactors balance voltage levels, especially in long-distance power transmission lines. This ensures that electricity flows smoothly and efficiently, reducing the risk of power outages and the need to dispatch costly grid-balancing plants or having to resort to load-shedding.

PGCIL's multi-million order for several 765 kV Shunt Reactors will be executed through GE T&D India, the locally listed entity of GE Vernova. The Indian affiliate will be responsible for providing the complete equipment package, including design, engineering, manufacturing, testing, erection, and commissioning of the 765 kV class reactors at the designated transmission substation sites.

The reactors will be manufactured at GE T&D India's Vadodara plant and are scheduled for delivery in the financial year 2025-26. ■

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