



China steps up coal and gas production as electricity demand soars

Chinese authorities are calling for higher domestic coal and gas production as electricity use increased throughout the second half of this year and is likely to hit a record-high this winter. Peak electricity demand is set to rise by 12.1%, or 140 GW this winter, China's National Energy Administration (NEA) forecasts, warning of shortages in Yunnan province.

Last winter's peak demand was 1,159 GW but NEA expects China's energy hunger this year will be even more due to the country's economic recovery and a hotter-than-normal summer. This summer's peak electricity demand was some 50 GW higher than in the previous summer, a 3.6% rise from last year's 1,390 MW.

Coal to cover bulk of demand

Generally, NEA sees China's power supply during the winter as "guaranteed" but there may be shortages in Yunnan province and Inner Mongolia. Eager to stabilise supply this winter, NEA wants to ensure that the production of thermal coal remains at a high level



Coal transported to a Chinese power plant

– especially coal with a high calorific level from Yunnan. Stocks of coal at power plants are meant to be kept a record high of 200 million tons – some 30 million tons more than last year's levels – in an attempt to guarantee stable electricity supplies.

Chinese coal miners in Yunnan and other regions were also told to maximise production prior the peak winter demand period.

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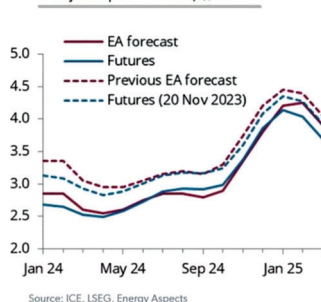
Henry Hub price estimate slashed on mild weather, record production

Price projections for Henry Hub have been slashed on mild weather and high production. December is forecast 10% warmer than normal, lowering gas demand for heating, while near-record high US production and flexible imports from Canada can cause an oversupply for 2024. Energy Aspects hence cut its balance-of-winter estimate to \$2.77/MMBtu which boosts gas-burn for power gen.

The share of gas in thermal generation is now forecast at 71%, down from 71.5% over summer 2023, as demand for gas-burn falls due to the rising contribution from solar power and a return to seasonal normal wind capacity factors.

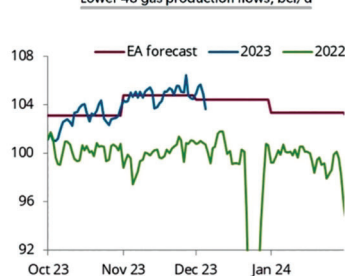
Load on the grid, and related electricity demand, is set to rise about 1% as milder weather in Texas is offset by a return to seasonal normal in the PJM and MISO power market zones. Investment in data centres and manufacturing further raise baseload

Henry Hub price forecast, \$/mmbtu



Source: ICE, ISEG, Energy Aspects

Lower 48 gas production flows, bcf/d



Source: Ventyx, Energy Aspects

power demands.

High thermal coal inventories pose some downside risk to gas consumption forecasts, Energy Aspects cautioned, but gas-burn caused by coal

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Between January and September, Chinese coal production increased by 3% and the government approved over 50 GW of new coal power even though it continues to build out solar and wind energy sources.

Aiming for price stability

As one of China's main energy market regulators, NEA underlined the country's gas strategy is to strengthen domestic production and long-term contracts to maintain

price stability. The government aims for domestic gas to cover more than half of demand in the long-term, allowing for gas to be used as a peak-shaving tool at times of high electricity demand.

CNOOC anticipates an 8% rise in gas demand year-on-year, covered both by LNG and rising Russian pipeline gas deliveries. NEA already reminded gas suppliers to fill up their storages to shield against possible supply disruptions in the

international market.

To stabilise supply, Chinese companies sealed nearly 17 million ton per year of long-term LNG offtake accords last year, with Free-on-Board (FOB) making up nearly 60% of the total. At the same time, pipeline gas deliveries saw a staggering 54% increase, which according to NEA underlines the importance of this partnership in China's energy import strategy. ■

Gunvor to buy BP's 75% stake in gas power plant in Bilbao

Energy trading house Gunvor has agreed to acquire BP's 75% stake in a gas-fired power plant in Bilbao, Spain, for an undisclosed amount while the remaining share will stay in the hands of the Basque regional government. The 785 MW plant will be Gunvor's first power station and the deal is expected to close in the first quarter of 2024.

The Bahía de Bizkaia Power Station is a combined-cycle power plant in the port of Bilbao and went into operation in 2003. The plant is owned and operated by BBE, once equally owned by BP, Ente Valsco de la Energia (EVE), Repsol and Iberdrola. But the latter two sold their 25% stakes to BP a decade ago for €135 million and €111 million, respectively. Now Gunvor will take over BP's majority share while BBE will keep its shareholding.

Gunvor's purchase of BP's lion stake in BBE builds upon its investments in two bio-fuel plants in Huelva and Álava. "We have track record of integrating and aligning industrial assets with our core physical energy trading business," said Aldo Della Valle, head

of European Gas & Power Trading. "With BBE, we hope to similarly align our trading in natural gas/LNG and power with the plant," he explained, adding Gunvor intends to retain BBE's current employees and management.

In 2022, Gunvor Group generated \$150 billion in revenue on 165 million metric tons of turnover by shipping physical energy worldwide. The Geneva-headquartered group seeks to expand its presence in renewables through an investment vehicle, named Nyera.

Commenting on the BBE divestment, BP's head in Spain Andrés Guevara said: "This decision reflects our

strategy of transforming from an International Oil Company (IOC) into an Integrated Energy Company (IEC) that aims to become net zero by 2050 or sooner." Spain remains a key market for BP but the company reorient investments towards electric vehicle charging, bio energy, renewable power and hydrogen. ■



Bahía de Bizkaia Power Station at the port of Bilbao

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power plant retirement tends to be underestimated in non-ISO markets and then there is the growing need to balance intermittent renewable energy supply with dispatchable electricity from gas peaking plants.

Spring demand lull

For spring 2024, bearishness prevails for Henry Hub prices as balances point towards an end-October carryout above 3.9 trillion cubic feet throughout much of the summer. "The fear of such oversupply dropped cash prices to a Q2 23 average of just

\$2.12/MMBtu," analysts commented.

But after the lull in demand in springtime, peak summer electricity usage and the start of commissioning activities at the Golden Pass LNG export terminal is bound to increase gas demand.

"If warm weather persists and an end-March near 1.9 trillion cubic feet (tcf) becomes more certain, Henry Hub prices will likely need to reprice lower still, potentially to a level near \$2.00/MMBtu again in Q2 24," analyst noted, concluding this would make dry gas production deferrals a possibility again. ■

Fossil fuel demand projected to peak by 2030, despite higher gas use

McKinsey modelling finds the world's overall demand for fossil fuels will peak by 2030, although gas demand will keep rising largely due to the fuel's balancing role for renewables until batteries are deployed at scale. Post 2050, the outlook for gas differs widely and hinges on the pace of renewables build-out and electrification.

Oil demand almost halves by 2050 in the Achieved Commitments scenario, assuming a slowdown in car-parc growth, enhanced engine efficiency and continued electrification of transport. In contrast, in the Fading Momentum scenario, oil demand would decline by just 3% over the same period.

Unabated coal is likely to be phased-out entirely overtime – replaced by generation from hydrogen-ready gas power plants which are flexible in dispatch and can support grid stability.

Renewables will continue their rapid growth – given that they are already the lowest-cost option for incremental new-built power generation capacity in many regions. By 2030, McKinsey expects renewables will provide between 45% and 50% of global generation, and between 65% and 85% by 2050.

The fast ramp-up of renewables, especially solar power, could see power sector emissions plunge by up to 71% by 2050 compared to current levels, despite a doubling of electricity demand. But supply chain issues and slow grid build-out is hampering the green energy transition.

Major investment needed

Investments in the energy sector are projected to grow by between 2% and 4% per

annum – roughly in line with global GDP growth – to reach between \$2 trillion and \$3.2 trillion in 2040. But despite regulation favouring decarbonisation, between 25% and 40% of that investment will still be spent on conventional power generation to offset plant retirements and ensure the availability of dispatchable assets to balance the system.

The focus will gradually shift to green technologies, which currently only account for 20% of total investment but that figure is expected to reach over 40% by 2040.

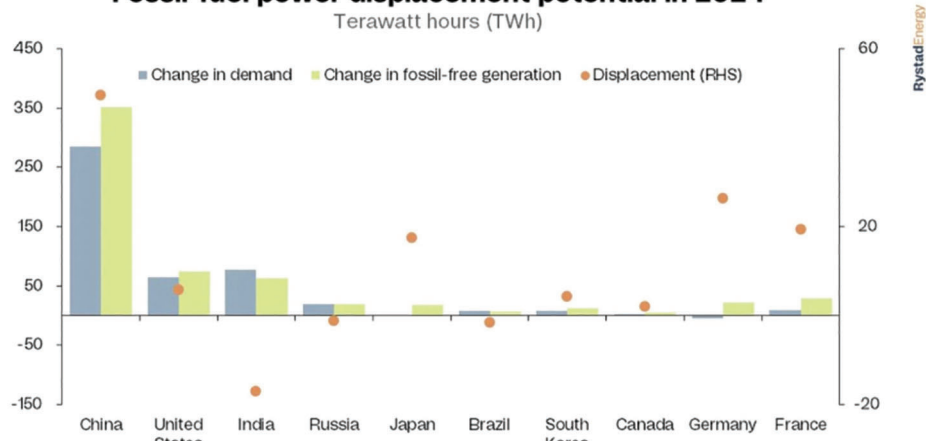
The transition will be mainly driven by the strong uptake of EV charging infrastructure and CCUS, which together are likely to account

for the bulk of decarbonization investments.

Despite the absolute increase, McKinsey analysts point out that energy investments as a share of GDP remain stable at between 1.2% and 2.2% across all years and scenarios.

Bottleneck that could slow the transition are limits of raw materials for batteries and wind generation, as well as insufficient manufacturing infrastructure or land availability for green energy sources. Still, analysts remain positive given that a look at the past two decades shows: despite massive and unprecedented uncertainties, the growth in several low-carbon technologies has continued and even accelerated.

Fossil-fuel power displacement potential in 2024



Oil & gas sector outlook 'neutral' in 2024 amid fairly strong earnings

Earnings in the oil and gas sector will be "fairly strong" next year, Fitch Rating says anticipating high oil prices due to OPEC+'s continued curtailments and slowing US production. The sector outlook is "neutral" – despite falling demand – as cost controls support companies' profitability hence the EBITDA margin for Fitch-rated global producers "should decline only slightly."

Price assumptions for TTF gas prices have been raised as large increases in global LNG export capacity will come online only by 2026 from new projects in Qatar and the US. Build-out of European LNG import infrastructure is ongoing, with 36.5 bcm of regas capacity added since the start of Russia's war in Ukraine and a further 106 bcm planned by 2030.

this year.

Reacting to slower demand growth, most producers will maintain or decrease capital expenditure – though about a quarter of companies said they would raise Capex by more than 10%. The green energy transition accelerates the slowdown in oil demand with OPEC's spare capacity deemed sufficient to absorb potential shocks.

Earnings are impacted by easing demand, with Fitch noting that EBITDA net leverage of about 70% of oil and gas companies will remain broadly stable or decrease, with median leverage remaining about 1.0x – which is "very low by historical standards." Most companies will hence have "significant headroom under [Fitch's] leverage-based rating sensitivities."

Global Oil and Gas Companies' Median Metrics

	2022	2023F	2024F	2025F
Cumulative revenue growth (yoy) (%)	48	-10	-2	-4
EBITDA margin (%)	36	36	34	34
FCF margin (%)	5	2	3	2
EBITDA gross leverage (x)	1.2	1.5	1.4	1.4
EBITDA net leverage (x)	0.8	1.1	1.0	1.0

No Asian call on US spot LNG as sufficient West African supply on offer

Asian gas importers do neither issue large buy tenders for balance-of-winter delivery nor do they call on US spot LNG amid mild weather, high stocks and Panama Canal restrictions. CNOOC and PetroChina are on the sell side and analysts see sufficient West African supply on the margin to balance the market east of Suez in the first quarter of 2024.

Rather than looking to buy, CNOOC offered one cargo for January loading from the North West Shelf project, following a recent sell by Unipet. PetroChina is also on the sell side for winter deliveries, Energy Aspects understands and JERA mentioned it has sufficient LNG supply for this winter.

On the supply side, risks ease as the 9 mtpa Australia Pacific LNG projects will soon resume to service, shipping cargoes mostly to China and minor volumes to South

Korea. Moreover, marginal supply from West Africa is demand sufficient to meet demand from power generator and industry in Asia going into next year.

Stocks of natural gas in Japan, South Korea and Taiwan are pegged to be 12.2 million tons by end-November, some 1.1 mt above the five-year average but 0.8 mt below last year's record level.

Beware weather risk

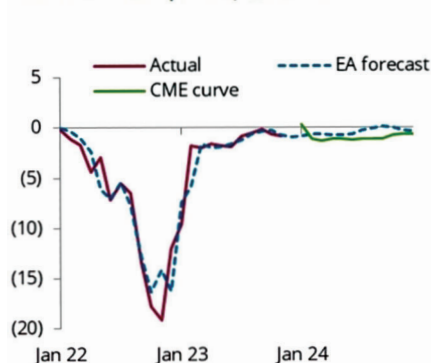
Colder weather in January and economic

growth is likely to boost China's LNG demand by 1.9 mt year-on-year in the first quarter of 2024, though higher pipeline gas deliveries will meet most demand growth. Energy Aspects remains bearish against the JKM-TTF Dec-23-Mar-24 spreads, though a 0.2 million ton per month tightening in its Asian balance would create an interest for US cargoes.

"JKM-TTF spreads can rise abruptly on any additional Asian demand given the Panama Canal restrictions, as companies – especially those with no pre-booked slots – may ship the longer routes of Suez Canal or Cape of Good Hope," analysts explained.

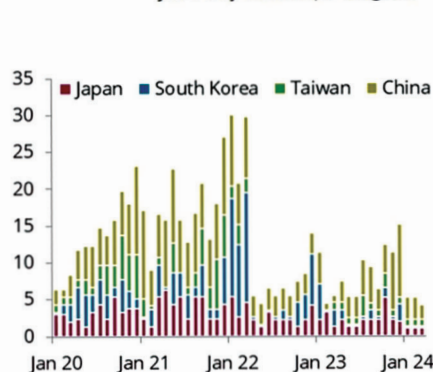
Freezing temperatures in November prompted many Chinese municipalities, including Beijing and some in Hebei and Shaanxi, to start district heating ahead of schedule with utilities dispatching coal- and gas-fuelled cogeneration plants. A short-lived cold spell should have little impact on LNG demand, analysts reckon, considering China can draw on robust domestic gas production, the ramp-up of Russian pipeline gas deliveries and higher stock-builds estimated at 20.7 bcm, for now. ■

NWE DES-TTF spreads, \$/mmbtu



Source: Argus Media Group, CME, Energy Aspects

JKTC buy tenders, # cargoes



Source: LSEG, Bloomberg, Argus Media Group, Energy Aspects

Wind and solar won't close South Africa's electricity gap; analysts says

Though South Africa is spearheading the continent's renewable build-out, it is unrealistic that wind and solar energy alone can cover the country's electricity needs. Renewables require costly grid upgrades as well as balancing power, hence analysts at the Washington-based Centre for Strategic and International Studies (CSIS) say it would be more prudent to transition from coal to gas power.

Using the United States as an example, CSIS research director for energy security and climate change Gracelin Baskaran said it would cost \$2.2 trillion for the transmission grid upgrades required to supply 85% of the country's population with renewable energy.

Back in 2021, state utility Eskom's oldest coal power stations – Camden, Arnot, Hendrina, Komati, Grootvlei and Kriel – were exempt from stricter emissions standards on the condition they are decommissioned by 2030. Renewables or gas power will need to replace them.

Ministry wants to accelerate gas power projects

South Africa's electricity minister Kgosientsho Ramagopa vowed to speed up plans for 3 GW of gas-fired power generation capacity to avoid daily cuts in electric-

ity supply that are hurting the economy. Shortages are caused by regular faults at Eskom's ageing coal-fired plants, with officials estimating up to 6 GW of new capacity is needed to end rolling blackouts.

Build-out plans include a 2 GW mobile plant – partly based on a floating power barges offshore – and a 1 GW plant near Coega, with the minister disclosing the government was at the procurement stage for these two projects. In May, South Africa's Department of Mineral Resources and Energy launched a Request for Proposals (RFP) for 2,600 MW of new capacity. In total, ministry seeks to procure 11,813 MW of electricity from various power sources including renewable energy, storage, gas and coal.

Eskom for long seeks to build a 3,000 MW



Eskom's Camden power plant

gas power station at Richard Bay to start supplying dispatchable electricity to the grid from 2028, in a bid to help end load-shedding. But debt relief conditions prevent Eskom to take out loans to build new stations hence it approached the National Treasury to find alternative ways of funding. Possible solutions would be a public-private partnership or a firm power purchase agreement with an independent, privately-run electricity producer. ■

Delayed gas power strategy threatens 2030 coal phase-out in NRW

North-Rhine Westphalia (NRW), Germany's most populous and heavy industrialised western state, wants a quick launch of a federal power plant strategy – despite the government's budget crisis. NRW alone needs six new gas power plants but delayed planning undermines the agreed 2030 end-date for coal-fired power, state premier Hendrik Wüst warned, calling for clarity "no later than next year."

Wüst, together with federal economy and energy minister Robert Habeck, had agreed a plan for phasing out coal in NRW in 2030 – eight years earlier than the official end date for the entire country. But building the envisaged hydrogen-ready gas power plants take between five to six years, hence decisive steps must be taken before 2025 to meet the 2030 deadline, Wüst stressed, noting: "So far, we've been waiting in vain."

The federal government's funding plan for energy programmes had been declared

“

There can be no phase-out without a phase-in....Grid operators in our western neighbour countries are ready to go ahead....

”

- Hendrik Wüst, state premier, North-Rhine Westphalia

"unlawful" by Germany's highest court in November.

The ruling dismissed the coalition's plans to use €60 billion in debt, initially allocated for pandemic response, for energy projects instead. Finance minister Christian Lindner said the court ruling made "far-reaching

changes" to the budget for 2024-2027 necessary.

Security of supply concerns

Decommissioning NRW's entire fleet of coal power plants requires a timely replacement. "There can be no phase-out without a phase-in," Wüst said, stressing that supply security overrides all other targets.

A federal grid development plan is also of the essence, as the new power plant need to be supplied with fuel – first with natural gas and later increasingly with hydrogen. Large volumes of the latter is anticipated to be sourced via the sea ports in Belgium and the Netherlands.

"Grid operators in our western neighbour countries are ready to go ahead," Wüst said, urging the federal government and the grid agency BNetzA to lay out plans for a federal hydrogen grid and related storage.

As for renewables, "NRW is doing its homework," the state premier noted with reference to the approval of 278 new wind energy units this year alone – 20 times as many as in Bavaria. ■



Render of a hydrogen-ready gas power station

EU approves German state aid for RWE's closure of lignite power plants

The European Commission today found €2.6 billion in German state aid to compensate RWE for an early phase-out of power plants. The closure of RWE's profitable lignite-fired power plants in the Rhenish mining area is part of Germany's effort to end coal-fired power generation by 2038 which helps meet its 2030 climate goals.

"The contribution to EU environmental and climate goals of the measure outweighs any potential distortion of competition brought about by the support," the commission said, arguing on this basis, German measure is approved.

To implement its coal phase-out law, the German government agreed with the main producers of lignite-fired electricity,

RWE and Lausitz Energie Kraftwerke AG (LEAG), to close emission-intensive lignite-fuelled plants ahead of time. In return, RWE was promised €2.6 billion in compensation for shuttering lignite plants in the Rheinland and another €1.75 billion was earmarked for LEAG for closing plants in the eastern Lausitz region.

Today's decision only relates to RWE's lignite power plant and does not cover the Commission's formal investigation into the compensation

measure in favour of LEAG. The Commission acknowledged there are challenges that lignite exit poses for the affected regions and workers in eastern Germany – hence that exit timeline may shift. ■



RWE's lignite-fired Neurath power plant

Mitsubishi helps ADNOC develop blue ammonia value chain

Mitsubishi Heavy Industries (MHI) has agreed to help ADNOC produce blue ammonia, supposedly at Ruwais refinery, where Abu Dhabi's state oil firm already produces over 300,000 tons of hydrogen. Musabbah Al Kaabi, ADNOC's head of low carbon solutions said the aim is to build NH₃ and H₂ supply chains to meet demand from power generators all over the world.

Blue ammonia is made from nitrogen and "blue" hydrogen derived from natural gas feedstocks, with the CO₂ by-product from hydrogen production captured and stored. Most of the low-carbon fuel is meant to be exported – notably to Japan, – with ADNOC envisaged blue ammonia production facility at the Ruwais Industrial Complex designed to 1,000 kilotons per annum.

The project leverages the UAE's large natural gas reserves and opportunities to capture carbon in depleted fields or use for enhanced oil recovery. At the Al Reyadah carbon capture, utilization, and storage (CCUS) facility, ADNOC already captures up to 800,000 tonnes of CO₂ from local steel production.

Power gen equipment, produced by MHI, includes hydrogen-fired gas turbines and ammonia-fired gas turbines, ammonia co-fired boilers as well as electrolyzers. The Japanese company will draw on knowledge

from proof-of-concept testing at Takasago Hydrogen Park to increase the feasibility of products and provide support for ADNOC's ambition to achieve net zero by 2045.

NH₃ combustion tests

Combustion test of an ammonia single-fuel burner have been successfully completed at the Nagasaki District Research & Innovation Center. With fuel consumption of 0.5 tons per hour, MHI carried out a single-fuel test as well as a high-ratio ammonia co-firing test with coal at a special burner – both reducing NO_x emissions.

As a next step, MHI plans to conduct a combustion test using an actual size burner in a larger 4 ton per hour (t/h) combustion test

furnace. Based on these results, MHI will then take steps for application of the burner it has developed for thermal power plants in Japan and overseas. Together with Centrica, Mitsubishi Power is exploring the development, construction, and operation of Europe's first-ever ammonia-fired power generation facility at Bord Gáis Energy's Whitegate combined-cycle power station in Cork, Ireland. ■



ADNOC's Ruwais refinery

Lummus helps transfer heat at NET's near-zero emissions power plant

Recuperative heat exchangers (HXR) from Lummus Technologies are meant to be installed at the 300 MW Project Permian, NET Power's first utility-scale gas power plant with near-zero emission in Texas. A strategic supply agreement was just signed but NET will wait for FEED to be completed before releasing initial long-lead equipment orders in the first half of 2024.

Front-end engineering design (FEED) for Project Permian is currently being carried out by the Zachry Group and due completed early next year. Construction will start shortly thereafter but the plant's start-up may well be delayed.

The arranged Lummus HXRs recovers energy from the turboexpander exhaust and air separation unit to reheat recircu-

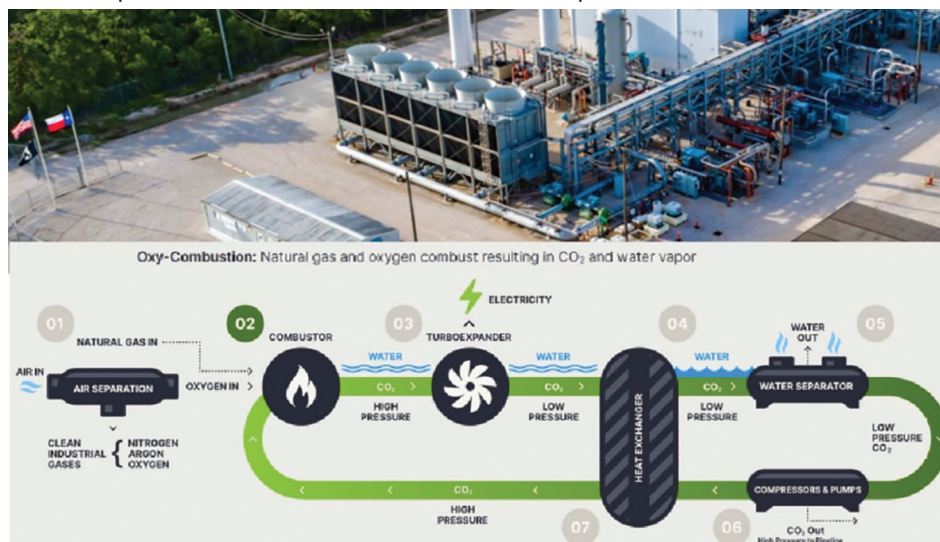
lated CO₂ – a vital component for the supercritical CO₂ power cycle whereby natural gas is combusted with pure oxygen. The resulting hot CO₂ and water spin a turboexpander to produce electricity. When the exhaust cools, water and by-products are removed while most of the CO₂ is compressed and recirculated back to the turboexpander.

Delay despite successful test runs

Combustion test at the La Porte test facility were carried out to "de-risk our first utility-scale project," NET CEO Danny Rice said. Still, the timeline slipped for Project Permian which was initially scheduled to start operation in 2026. "Due to the tightness in the global supply chain, we are incorporating a 12-month cushion into our schedule for Project Permian," he said, specifying initial power generation is now expected "sometime between the second half of 2027 and first half of 2028."

Expenditures related to Project Permian totalled \$2.5 million in the third quarter of this year but Rice was quick to add that NET Power was "over-capitalized upon going public."

Oxyfuel combustion plants, like Project Permian, use the Allam-Fetvedt sCO₂ cycle to generate electricity with a carbon intensity similar to solar or wind, coupled with a short-duration battery, at a levelized cost of \$21-\$40/MWh, the developer said, adding a single 300 MW plant would generate enough electricity for over 220,000 homes per year in the United States. ■



Saudi Arabia's 3.5 GW Power Plant 10 switches from liquid fuels to gas

Works have begun to convert Saudi Electric Company's Power Plant 10 (PP10) in Riyadh from running on natural gas, instead of more emission-intensive liquid fuels. PP10 runs on 40 of GE Vernova's 7E gas turbines in combined-cycle configuration and can deliver about 3.5 GW of electricity, the equivalent capacity needed to power up to 875,000 homes.

Once competed, each gas turbine's efficiency is expected to increase, which results in greater electricity output per unit of fuel consumed and lower cost of fuel per megawatt-hour (MWh). Additionally, the converted units would be able to deliver more flexible, amid longer inspection intervals and longer parts life compared to gas turbines powered by liquid fuels.

Gas-fuelled power plants can avoid carbon lock-in by using low or near zero-carbon fuels such as hydrogen, combined with carbon capture technologies – both of which the Saudi kingdom vowed to invest in at the COP28 climate conference.

"With electricity demand being high across the Kingdom due to factors like hot and harsh environmental conditions, a growing population, and the concentration of energy-intensive industries such as oil & gas, smelters, and petrochemicals, the availability of firm power on demand is crit-

ical in Saudi Arabia. Reducing the intensity of carbon emissions from power generation activities in the country is an important part of addressing the climate challenge," said Joseph Anis, CEO of Europe, Middle East & Africa for Gas Power at GE Vernova.

The PP10 modernisation project will leverage the expertise and know-how built at GESAT, a joint investment by Dussur and GE Vernova to manufacture heavy duty gas turbines and components in the kingdom. Local experts at GESAT are manufacturing gas fuel skids for the project, which consist of control valves, piping, and accessories.

The American manufacturer suggested "successful completion of the project can potentially provide learnings that can be applied to convert other liquids-fuelled 7E units across Saudi Arabia to also operate on lower carbon-intensive natural gas." ■



SEC's massive PP10

GE to service Shuaiba North Power Station

Malay-Kuwaiti engineering joint venture TNB Remaco – Al Dhow has awarded GE Vernova a service agreement for the Shuaiba North power station (876 MW) in Al Ahmadi, Kuwait. The five-year agreement includes the supply of parts, repairs, field services for the 9F gas turbines installed at the plant as well as advanced predictive maintenance and digital solutions.

Shuaiba station consist of three blocks, each powered by a 9F.03 gas turbine and generator. The service deal stipulates that GE Vernova will upgrade the turbines' currently installed combustion technology to the Dry Low Nox DLN2.6+ system which improves operability, lowers emissions and extends turndown capability as well as inspection intervals.

Supply of parts, repairs, field services and the cloud-based Asset Performance Management (APM) software is also included in the deal. By incorporating APM, the Shuaiba power station can undergo predictive maintenance for the gas turbines and accessory equipment.

"We expect that the services and digital technologies provided by the GE Vernova team will help increase the efficiency and improve performance of the plant, which is crucial in powering Kuwait reliably," TNB Remaco chairman Muhammad Nazri Bin Pazil said.

The Shuaiba service agreement is part of a broader effort by the Kuwait's Ministry of Electricity, Water and Renewable Energy to modernize the emirate's power generation infrastructure. ■

Centrica and Mitsubishi develop Europe's first ammonia-fired CCGT

British utility Centrica and Mitsubishi Power are exploring the development, construction, and operation of Europe's first-ever ammonia-fired power generation facility at Bord Gáis Energy's Whitegate combined-cycle power station in Cork, Ireland. As one of only two such plants in the world, the CCGT will demonstrate the use of ammonia as an emission-free fuel.

Low carbon ammonia has a higher volumetric density than hydrogen, enabling the utilisation of low carbon hydrogen in a form which is easy to transport and store. Its use as a fuel is a promising long-term solution to decarbonise power generation and industry.

The ammonia for the Whitegate CCGT in Ireland will be through Centrica's global trading network.

Chris O'Shea, Group CEO at Centrica said



Render of the ammonia-fuelled Whitegate CCGT

the project would be one of many where the utility seeks to demonstrate how the hydrogen economy could work in practice. "In this instance, we hope to be able to show how hydrogen could be stored and transported as low carbon ammonia, delivering cleaner energy for customers at the point of use," he explained.

Several ammonia-related projects are in the making globally, advanced by affiliates like the Green Ammonia Consortium in Japan, the Australian Renewable Energy Agency (ARENA), and Neom in Saudi Arabia.

So far, ammonia has been included into the fuel mix through co-firing at coal power plant – a process that blends ammonia with coal during the combustion process which allows the plant to use less coal to produce the same amount of electricity. Though combusting ammonia produces no emissions, its overall carbon footprint depends on the way the ammonia has been produced. ■

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