



Henry Hub bearish but shut-ins at Haynesville Shale still a long way off

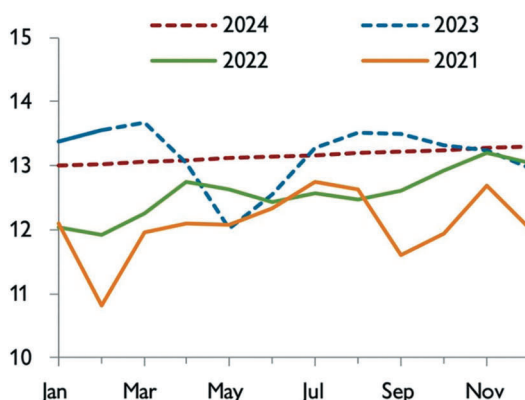
Mild weather forecasts for April and growth in US gas production of 6 billion cubic feet per day (bcf/d) year-on-year is weighing on near-term prices. According to Energy Aspects, production at Haynesville Shale will only respond once Henry Hub gas prices have fallen to or below \$1.75/MMBtu – though this is unlikely to occur before summer sets in.

Though gas prices keep falling, analysts doubt they will drop low enough for shale gas producers to start shutting active wells during the spring shoulder season. The Henry Hub gas spot price was last seen trading at \$2.17/MMBtu – still far above the trigger point for shut-ins.

Looking ahead, analysts are confident near-term prices will fall to sufficiently low levels to incentivise Haynesville shut-ins and balance the market during the summer season. However, reduced dry-gas drilling is unlikely to begin weighing on Lower 48 gas production growth before the third quarter of 2023.

Freeport LNG's return to normal operation has temporarily

Haynesville production forecast, bcf/d



Source: EIA, Ventyx, Energy Aspects



boosted short-term demand, with LNG feedgas now seen to peak above 14 bcf/d on a daily basis. But support from seaborne US gas exports is likely to be short-lived, analysts cautioned, as regulatory maintenance works are scheduled to start in late April.

Cameron LNG typically start taking trains offline for routine inspections towards the end of April, before works at Cheniere's

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EU restrictions on Russian LNG exports could make Kremlin retaliate

Proposals to empower EU governments to limit upfront bidding for regas capacity for Russian LNG deliveries could prompt the Kremlin to retaliate, global research scholar Anne-Sophie Corbeau warns. Shutting-down of one Train at Yamal LNG would cut supply by roughly 8.8 bcm/y while halting gas flows through Ukraine and TurkStream could remove a further 20 bcm/y – sending spot prices soaring.

Entering spring, EU leaders are reassured by a considerable drop in gas prices – down from up to \$100/MMBtu last August to around \$13-15/MMBtu as of early April. With considerable flows of LNG still coming to Europe, the EU Commissioner for Energy Kadri Simson has set out a legal option to prevent Russian companies from booking regas slots at European import terminals. So far, there are no concrete sanctions or a timeline for withdrawing from Russian LNG, hence traders keep chasing profits and continue to ship super-chilled gas from Russia to the EU.



Total wants to keep buying cargoes from Yamal LNG

Higher LNG imports helped Europe in 2022 balance reduced Russian pipeline gas deliveries but, ironically, some of this LNG originated in Russia.

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liquefaction plants limit feedgas demand in May through June.

Low prices push gas into the power sector

In the meantime, storage injections are going from strength to strength – despite the 450 bcf y/y end-March surplus. As gas inventory projections approach their maxi-

mum demonstrated capacity of just near 4.1 trillion cubic feet (tcf), Energy Aspects reckons that “every bit of lost demand will have to be made up by prices declining to push more gas into power [generation].”

Industrial gas demand currently stands at 24.7 bcf/d – some 1.6 bcf/d less than at the same time last year. Analysts believe baseload demand will flip positive by 0.4

bcf/d in the second half of 2023 largely due to a weak baseline in H2-2022 mid idled steel plants, weak auto and paper production and a late-year downturn associated with winter storm Elliott. Recession risk could still push industrial gas demand lower, analysts caution, though much depends on the timing and duration of such a downturn. ■

Henry Hub prices to rebound in third quarter on higher gas-burn

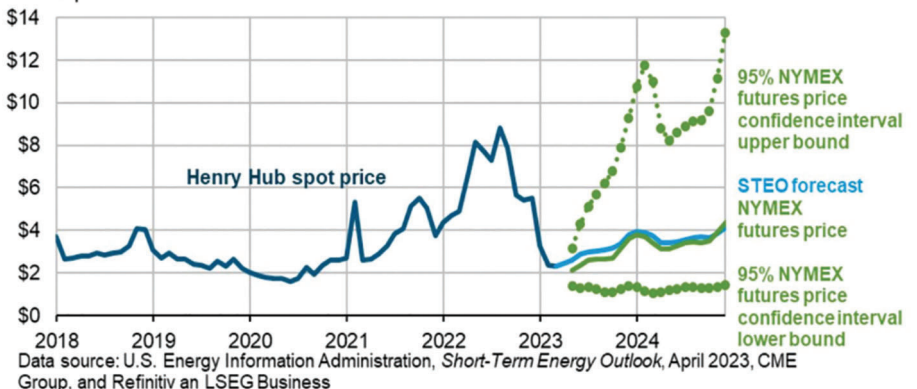
Increased gas consumption in the US electric power sector, rising demand for feedgas from Freeport LNG and unchanged production will push up the Henry Hub price to over \$3.00/MMBtu in the third quarter, government analysts forecast. Spring-like weather pattern had lowered prices to \$2.65/MMBtu early this year, while dry gas production averaged 101.6 Bcf/d amid no freeze-offs.

Associated gas production from the oil-rich Permian basin and record gas production from Haynesville region boosted gas supply in the first quarter. Though slight declines are forecast in April and May because of pipeline maintenance in West Texas and the Northeast, overall gas production is forecast to rise 3% year-on-year to average 100.9 Bcf/d for the full year 2023.

On the demand side, there has been less-than-usual gas use for space heating due to mild weather in the first two months of the year. Gas-burn for power generation increased due to low fuel costs, compared with thermal coal. With fuel switching in full swing, analysts at the US Energy Information Administration (EIA) forecast 17% less utilisation of US coal-fired generation in the spring of 2023 than in the previous spring.

Lower gas costs are the main driver for

Henry Hub natural gas price and NYMEX confidence intervals
dollars per million British thermal units



EIA's forecast that wholesale power prices in 2023 will fall from last year. For example, analysts expect the on-peak wholesale price at the North hub in Texas's ERCOT power market will average about \$35/MWh this year compared with an average of nearly \$80/MWh last year.

Looking at macroeconomics, analysts

refer to S&P Global figures showing that US GDP contracted in the first quarter but is expected to return to growth in the second quarter. High fuel price inflation is burdening industry and households, with consumer spending shifting away from goods toward services which reallocates economic activity away from manufacturing. ■

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Figures by the Center on Global Energy Policy (CGEP) show that Belgium and France in particular, as well as the Netherlands and Spain increased Russian LNG imports by around a third in 2022, to over 19 bcm.

Though Spain's Repsol and Enagas claim to not purchase Russian LNG, France's TotalEnergies stressed it has no intention to give up its 20% share in the Yamal gas liquefaction and export facility from where is sources a steady stream of cargoes. Nearly 94% of Russian LNG imports come from the Yamal terminal which liquefies gas supplies from the South Tambey field.

If the EU was to stop importing Russian LNG, these volumes would be mostly redirected to Asia. But given that Yamal LNG is geographically located closer to Europe than to Asia, this move would tighten supply during the winter season when the longer shipping routes to Asia is covered with thick ice.

It would also render impossible any transshipments of Russian LNG from nuclear ice-breakers, which typically takes place in Belgium and France, Corbeau pointed out, though she expects the impact on gas prices to be “limited.”

Considering that the Kremlin may decide to further reduce gas deliveries through TurkStream to Turkey and onwards to southeast Europe, policymakers in Brussels are well-advised to thread with caution. Preparedness is essential prior to restricting Russian LNG imports which would be widely seen as a ‘political move’.

EU leaders hence decided to extend the 15% demand reduction target of 60 bcm (against a five-year average) through to March 2024, while much also depends on whether the AggregateEU platform will succeed in securing additional gas supplies at a moderate price. ■

Gas to Power Journal

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JERA and Kogas to cooperate on LNG trading and cargo swaps

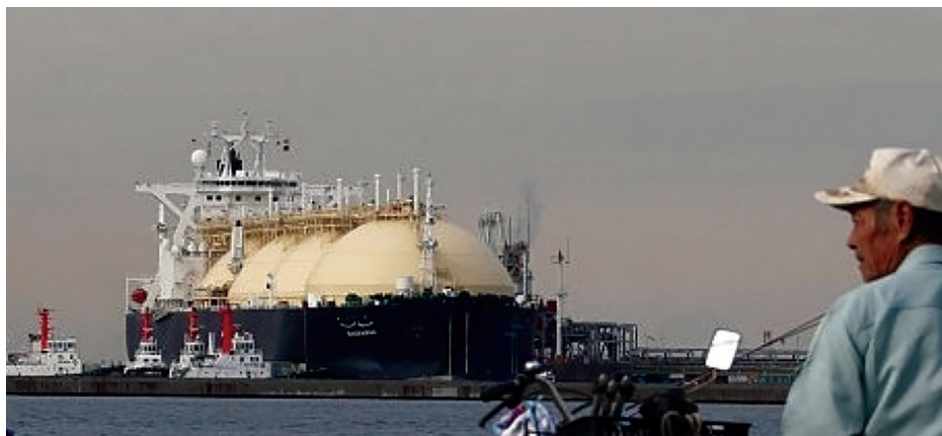
Japan's and South Korea's largest LNG buyers, JERA and Kogas, have agreed to work together in the LNG business for the sake of securing supply stability. The cooperation includes LNG swaps, trading, ship optimization as well as market view exchange and comes in response to joint gas buying efforts in Europe under the AggregateEU platform.

JERA purchases around 35 mtpa of LNG for import at 11 of Japan's 37 regas terminals as it provides fuel for 25 gas-fired power plants in Japan. Kogas, meanwhile, controls four out of seven of South Korea's import terminals and sources the bulk of gas to fuel the country's power stations.

Quest for supply stability

The quest for supply stability has prompted the former rival buyers to team up. "Russia's invasion of Ukraine has created a severe energy environment, such as the reduction of pipeline gas supply to Europe, and the uncertainty regarding global energy supply is drastically increasing," the two partners noted.

The risk that Russia's state-owned Gazprom could halt gas flows through Ukraine and TurkStream in 2023 to remove a further 20 bcm/y of contractual pipeline gas supply has made the EU extend emergency measures. The European Commission decided to extend the 15% demand



reduction target of 60 bcm (against a five-year average) through to March 2024 and set up an AggregateEU platform in the hope buyers can jointly purchase additional LNG volumes at more moderate prices.

"In responding to these circumstances, under this memorandum, JERA and Kogas, which are among the largest buyers in the global LNG market, will strengthen their strategic relationship and consider develop-

ing schemes of cooperation regarding their LNG supply and demand, to enhance stable energy supply in Japan and Korea," the companies stated.

In the long run, the two Asian majors see LNG to play an "even more important role in the energy transition." JERA hence vowed it will work together with LNG buyers and other leading companies both within and outside Japan as it seeks to enhance procurement capabilities. ■

Botaş hopes start of Saros FSRU will turn Turkey into a gas hub

Turkey's state-owned oil and gas supplier Botaş is about to start LNG imports at Saros Bay, following the late February arrival of the Vasant 1 FSRU loaded with a commissioning cargo from Egypt. The vessel has been prepared continuous regas operation for the next 12 months and is meant to turn Turkey into a regional gas hub.

Turkey uses a significant share of its natural gas imports to generate electricity and aspires to become a regional gas hub for supplying Russian gas and LNG onwards to eastern Europe. To that end, Botaş just signed a long-term deal with Bulgargaz which gives the Bulgarian gas company access to Turkey's gas network and LNG import terminals. The agreement allows Bulgaria to import about 1.5

Bcm of gas a year and Bulgargaz already made plans to book regas slots for about 1 Bcm/y at Turkish LNG terminals.

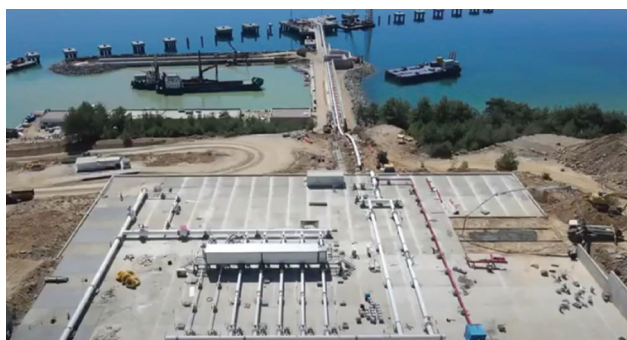
Apart from the Saros FSRU project in northern Turkey, state-owned Botaş also owns and operates the Iskenderun facility offshore Dortyol in the south of the country, while the independent player Pardus Energy has stationed the 170,000cbm Turquoise offshore Etki, a small town close to Izmir.

bloc's gas demand prior to the war in Ukraine, it still needs a minimum of 7% of its gas consumption coming from Russia, the French energy consultant Thierry Bros reckons.

The Russian President Vladimir Putin offered to step up flows and re-route them through Turkey: "We could move the lost volumes from the Nord Streams along the bottom of the Baltic Sea to the Black Sea region and thus make the main routes for the supply of our fuel, our natural gas to Europe through Turkey," Putin told an energy conference in Moscow. Creating a hub for Russian gas in Turkey could lead to an expansion of the 31.5 Bcm/year TurkStream pipeline, which currently just carries limited volumes to Turkey as well as Serbia and Hungary. Playing it big, Putin hinted at the option of a new interconnector though the Black Sea, though this would take at least three years to build. ■

EU may source Russian gas via Turkey

Boosting Turkey's LNG import capacity is one step to turning the country into a regional gas hub, along with stepping up imports of Russian pipeline gas through TurkStream. Though the EU has slashed its dependency on Russia, which covered 40% of the



Site for Saros FSRU in the Dardanelles, northwestern Turkey.



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German gov' urged to set clear restrictions on CCS use

Germany is re-evaluating the law on Carbon Capture and Storage (CCS) in order to capture between 34 and 73 million tonnes of CO₂ by 2045 and store it under the North Sea. Critics oppose utilizing CCS to extract fossil fuels or produce fossil electricity and only agree to use it for industry with a clear end-date and transition to renewables.

Electric utilities and energy-intensive industry had for long been pushing to implement CCS projects in Germany, but the technology had been politically untenable as it was seen as a lifeline for emission-intensive coal power generation. In fact, the current legal

framework makes it virtually impossible to start a CCS project on German soil.

But the new goal to become greenhouse gas

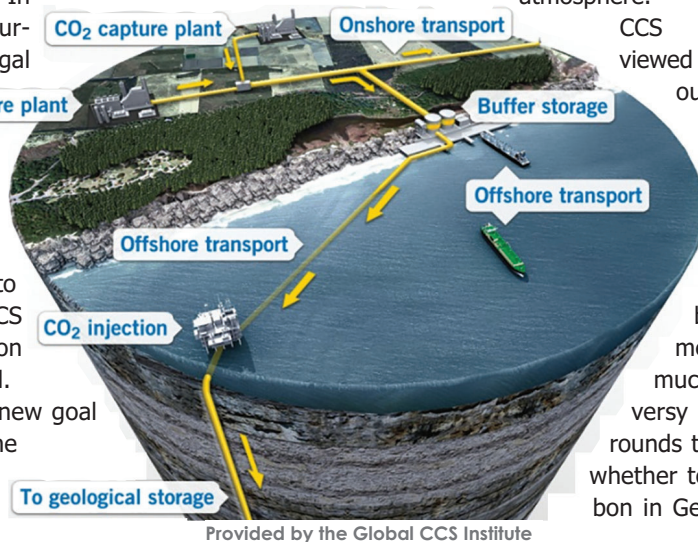
neutral by 2045 and to even have a negative emission balance by 2050, forces the federal government in Berlin into a debate into how not only mitigate emissions from power generation, industry and the transport sector but also remove them from the atmosphere.

CCS is widely viewed as the obvious solution, given that the technology is proven and ready to be implemented. But much controversy still surrounds the question whether to store carbon in Germany, and

if so, where.

Companies like the turbine manufacturer MAN, meanwhile, are pushing for a new CCS strategy to manage industries' unavoidable emissions. The industry association BDI wants the government to particularly consider the potential of utilising the captured carbon, e.g. by creating an integrated hydrogen-carbon cycle. Hereby, the captured carbon can be used to create synthetic fuel or blue hydrogen – a future fuel for power generation.

In its coalition agreement, the current government promised to develop a strategy for "technical negative emissions" to deal with the unavoidable remaining emissions, such as those created through agriculture and some industry. Lately, the government pledged it would support the first major projects through so-called carbon contracts for difference (CCfD) – though the project timeline hinges on when a new CCS law will materialise and come into force. ■



Adding CCS to fossil-fired power plants could worsen energy inflation

Policies incentivising the retrofit of coal- and gas-fired power plants with carbon capture and storage (CCS) risks to inflate generating costs and undermine plant economics. The Institute for Energy Economics and Financial Analysis (IEEFA) found levelized cost of electricity for thermal power generation with CCS are at least 1.5 to 2 times above current alternatives, notably renewables plus energy storage.

Proponents advocate CCS as way to render fossil power "sustainable", but who ends up paying for it is an uncertainty adding to the financing risk.

An Australia case study, carried out by the IEEFA, tries to quantify the real cost of post-combustion CCS for power generation: Wholesale prices averaged between A\$75 and A\$95 per MWh in Australia's National Electricity Market (NEM) over the past decade, where coal and gas accounts for around 70% of regional electricity output. If funded through electricity prices, applying CCS is expected to increase these prices by A\$100 to A\$130 per MWh, or 95% to 175%.

These higher wholesale costs would most likely be passed on to electricity consumers who were already burdened by the global energy price inflation. If not directly passed on to end-consumers, any government spending or subsidies for CCS would ultimately be borne by the public through, e.g.

through higher income taxes.

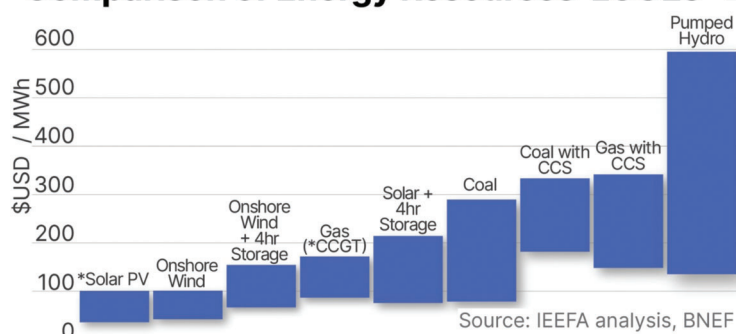
"The cost of CCS as a decarbonization option is more than just the cost of the carbon capture technology. The transport, storage, monitoring and verification, plus any additional compliance and liability costs will need to be considered for CCS to be considered a climate solution," said energy economist Michael Salt, an IEEFA guest contributor.

Of the two CCS retrofits projects implemented so far, the Petra Nova project in the US has since suspended operation and both projects had performed well below target capture rates of 90%. Moreover, no new fossil-fuelled power plant has been built with post-combustion CCS installed and

operating at a commercial scale.

Analysts hence suggest public funds should be used for "more technically sound options" other than post-combustion carbon capture. Though levelized costs of solar and wind power have recently crept up, the IEEA expects them to return to a downward trajectory as the technology is deployed more widely at a much larger scale. Renewables plus energy storage could displace coal- and even gas-fired power plants in the longer term, analysts reckon. ■

Comparison of Energy Resources' LCOEs



Southeast Hydrogen Hub applies for DOE funding from \$8bn scheme

The Southeast Hydrogen Hub coalition has applied to the U.S. Department of Energy (DOE) for funding to build a green hydrogen network, spanning six states and including five electric utilities. The DOE has made \$8 billion available under a scheme for the formation of regional clean hydrogen hubs, with funding decisions anticipated by autumn 2023.

Tax credits under the US Inflation Reduction Act (IRA) make it cheaper to produce hydrogen locally in the United States than to import it. Unit economics of clean hydrogen “dramatically improved” with breakeven across various use cases achievable in three to five years, McKinsey finds, anticipating production to rise six-fold to six million tons by 2025.

The IRA’s clean-energy tax credits and product credits could catalyse and potentially amplify the \$70 billion in clean-energy technology and demonstration projects under the Bipartisan Infrastructure Law. The two acts together mount an estimated \$370 billion in federal funding over the next five to ten years.

Substantial incentive for green H2

Asked to specify IRA incentives, McKinsey partner Joscha Schabram and consultant Arun Thomas explained that green hydrogen producers who hit the threshold of <0.45 kg CO₂ per kg H₂ can get a tax credit of \$3/kg over ten years. This is directly paid out for the first five years and, on a lifetime basis, translates into a benefit of roughly \$1.8/kg of hydrogen.

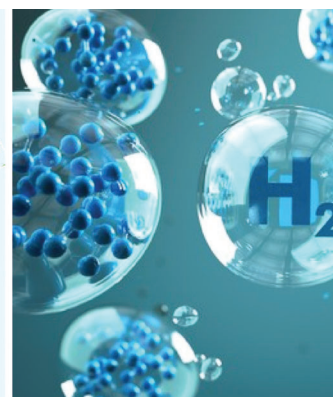
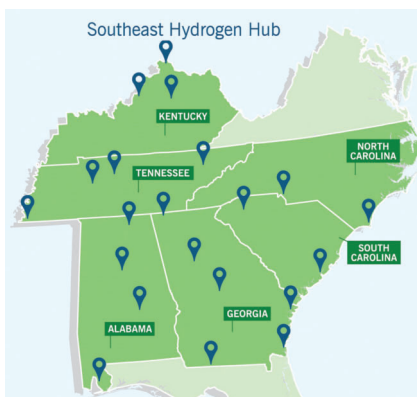
“That is a substantial incentive to produce green H₂, which could cost some-

where between \$4-5/kg to produce by mid-decade with all costs included,” Schabram and Thomas told Gas to Power Journal. By 2030, the amount of clean hydrogen production in the US is consequently expected reach 14 million tons versus 3.5 million tons in a pre-IRA scenario.

Chevron studies H2 project along the US Gulf Coast

Chevron, Air Liquide, LyondellBasell, and Uniper are evaluating the development of a hydrogen and ammonia production facility along the US Gulf Coast. Uniper could become one of the first large-scale offtakers, with CEO North America Marc Merrill disclosing plans to ship about 1 mtpa of ammonia to Wilhelmshaven in Germany by 2030.

The study will look at producing hydrogen from natural gas through steam reforming with subsequent CCS, as well as



renewables hydrogen via electrolysis. If realised, the project could make use of Chevron’s pipeline infrastructure and Air Product’s hydrogen network along the US Gulf Coast to supply lower carbon and renewable hydrogen to local industrial clusters. Likewise, ammonia infrastructure could support exports to both Europe and Asia Pacific.

As of today, there are 131 announced hydrogen projects in the United States. The main sites of planned production are in the Gulf Coast area, the Mid-West and along the East Coast. In total, some 5.5 million tons per annum of blue production is planned versus 1.8 million tons p.a. of green production, all by 2030. ■

UK gov’ supports first 20 green hydrogen projects, totalling 250 MW

Green hydrogen projects under development by Carlton Power, ERM Dolphyn, ScottishPower, SSE and Octopus Hydrogen have been shortlisted for UK state support. Contracts for these projects, with 250 MW capacity combined, will be awarded in the fourth quarter with Carlton Power aiming to start construction on its three projects in before the year-end to start commercial operation in 2025.

The 200 MW Trafford Green Hydrogen scheme, located in Greater Manchester within Carlton Power’s Trafford Low Carbon Energy Park is the UK’s largest consented green hydrogen scheme. The first project phase, with 15-20 MW, is

meant to be ready in less than two years’ time.

The 30 MW Barrow venture in Cumbria has been advanced together with Kimberly-Clark whose manufacturing facility in Barrow-in-Furness will offtake parts of the clean fuel to reduce its reliance on natural gas. Meanwhile, the 10 MW Langage Green Hydrogen Hub forms part of the Plymouth & South Devon Freeport.



Barrow Green Hydrogen Hub

Together, the three schemes represent some £200 million of direct investment, will replace around 215 GWh of natural gas for power generation and industrial use

and thereby reduce carbon emissions by 40,000 tonnes per annum from 2025.

“Our three projects will support the efforts of industry and transport operators in these areas to decarbonize. They will be a catalyst for new investment and employment to support the growth of the hydrogen economy across the UK,” Eric Adams, Carlton Power’s Hydrogen Projects Director said, expressing “huge gratefulness” for all support received to date.

Others shortlisted ventures to receive support include Octopus Hydrogen’s three projects – one in Scotland, one in Wales and one in southeast England – Scottish Power’s project in Wales and another in southeast England as well as SSE Thermal’s Aldbough venture, and more. ■

NET Power chooses Zachry to build clean gas power plant by 2026

The American clean energy producer NET Power has selected Zachry Group to provide front-end engineering design (FEED), followed by engineering, procurement and construction (EPC) services for NET's first utility-scale gas power plant with near-zero emission. FEED is expected to be completed in 2024 and construction will commence shortly thereafter for the plant to come online in 2026.

A modularized design approach is meant to drive down capital costs for the first, as well as subsequent clean gas power plants.

"Zachry has extensive experience in designing and constructing large-scale power and process plants (...) and a track record of building first-of-a-kind facilities; their FEED and EPC work for our first utility-scale plant will establish the standard for our future power plants," said Brian Allen, President and COO of NET Power.

Oxy-combustion

NET Power's patented oxy-combustion supercritical CO₂ power cycle has already un-

dergone successful proof of concept at its demonstration facility in La Porte, Texas. The subsequent construction and operation of NET's first utility-scale power plant is meant to pave the way for more environmentally responsible power generation, with several follow-up projects in the planning.

Founded in 2010 and headquartered in Durham, North Carolina, NET Power has received strategic investments from 8 Rivers, Constellation, Occidental, and Baker Hughes. It recently announced a co-operation with Rice Acquisition and prepares



NET's demo unit in Texas

to become listed on the New York Stock Exchange in the second quarter of 2023. ■

GE to deliver LM6000 gas turbine to Czech reserve power plant

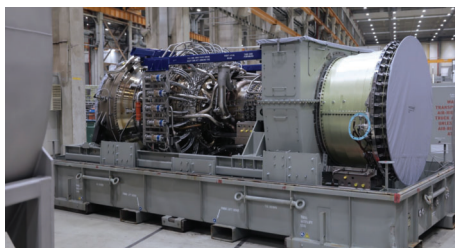
UCED Group, the energy division of the Czech investment group CREDITAS, has awarded an order to GE to supply an LM6000 PC Sprint aeroderivative gas turbine to expand the Prostějov reserve power plant. Once delivered to site and installed in early 2024, the turbine will add about 50 MW of power generation capacity to help stabilize the grid.

The project supports the Czech government's target to increase renewables and gas-fuelled energy sources by 30% by 2030, compared to 2005 levels.

Though greenhouse gas emissions have fallen in the Czech Republic since 1990, it remains the fourth largest emitter per capita in the EU, according to McKinsey's latest sustainability report. Due to a large presence of energy-intensive industries, the country's emissions intensity is much higher than the EU average but can be reduced by switching from coal to gas.

"The expansion of Prostějov power plant supports the Czech government's main target to diversify energy sources," Richard Holešinský, Investment Director at UCED said, stressing: "We are committed to becoming a leader in the new reserve power segment: we selected GE's aero technology for its fast installation, small footprint, and its operating flexibility."

Capable to start up in less than five minutes, the LM6000 can enhance grid stability which is challenged by the infeed of variable electricity supply. At the same time, it will allow UCED to better differentiate and adapt the dispatch of its power sources. Currently,



LM6000 gas turbine

the gas turbine can run on a 40% hydrogen blend and GE is committed to reach full H₂-firing in the near future.

Plan for 1 GW power complex

Going forward, UCED plans to add further power blocks to create a 1,000 MW complex by the end of the century at an estimated investment of over 20 billion Czech kronor. The 50 MW Prostějov unit will be part of UCED "virtual power plant" consisting of several decentralized, interconnected sources that will be dispatched by a central control room.

The main energy source will be gas – whether it will be natural gas, biogas, or gas blended with hydrogen – the Czech financial investor and energy infrastructure developer said, specifying the complex will also include solar parks, wind farms, thermal and biomass plants. ■

Nevada regulators give the green light for gas peaker at Silverhawk

Utility regulators in the US state of Nevada have approved a plan by NV Energy to invest \$333 million to install and operate a gas-fuelled turbine at the 520 MW Silverhawk Generating Station near Las Vegas. The turbine will have a peak summer rating of 444 MW, including wet compression, and is due to enter service in July 2024.

NV Energy specified it will invest another \$20 million on transmission upgrades to connect the plant to its regional grid. The utility underlined that even though it was adding fossil-fuelled generation, it was not deviating from its clean energy goals and the state's sustainability targets.

Regulators were told that dispatchable resources like the gas-fuelled peaking plant would contribute more to installed generating capacity in 2050 than to actual energy production, meaning it will primarily be dispatched as a backup power source – not least because the turbines' air permit application limits their use to 700 hours annually. ■



Silverhawk Generating Station



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