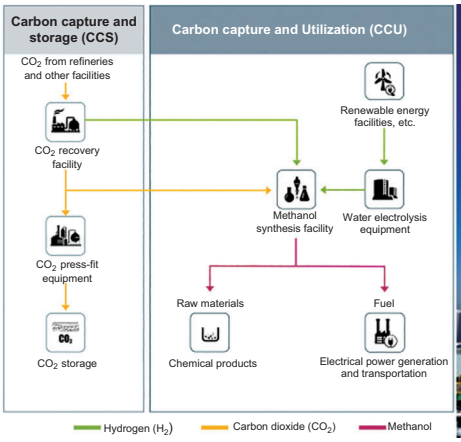
Gas to Power Journal
Peakload Power and Energy Storage

Focus on Renewables and Ammonia co-firing

Weekly News 24 June 2022

Three Mitsubishi sister firms recycle CO2 from refinery into methanol

Mitsubishi Hitachi Power Systems (MHPS), Mitsubishi Heavy Industries Engineering (MHIENG) and Mitsubishi Gas Chemical Company (MGC) are conducting joint research on effective recycling of CO2 – emitted from a refinery at Tomakomai City – into methanol. The CO2 is captured from the refinery's exhaust gases, stored and then synthesized into methanol, a fuel for various industries.



The process combines captured CO2 with hydrogen (H2), obtained either as a by-product from refineries or from water electrolysis within the existing Carbon Capture and Storage (CCS) facilities at the refinery.

Scope of the R&D project at Tomakomai refinery, Hokkaido province, includes performance assessments of key components in all facilities involved, a technology survey and basic engineering for optimizing plant configuration. The Mitsubishi group companies will also evaluate the economic feasibility of carbon capture, storage and reuse with the aim of replicating the demo project elsewhere in Japan or abroad.

The project survey assumes that an additional 20 ton/day class carbon-recycled methanol synthesis plant will be installed adjacent to the existing CCS facility.

Tasks are equally split: MCG will share its supply chain expertise related to methanol production and synthesis catalysts, as well as process technology for methanol production. MHIENG will leverage its EPC track record in building a number of large-scale methanol plants, while MHPS will add its energy and power generation-related experience to help ensure a smooth implementation of the project.

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Wood and C-Capture get UK gov' funding to demonstrate low-cost CCS

Wood Plc and C-Capture, developer of a chemical CO2 removal process, have received £1.7 million in government funding to demonstrate low-cost CCS is feasible for hard-to-abate industries. The funds go towards the £2.7 million XLR8 CCS project whereby carbon capture solvent compatibility units (CCSCUs) will be deployed across Britain's cement and glass industry.

Compatibility of C-Capture's solvent-based technology will be trialled and assessed with real-world flue gas across three hard-to-abate sectors – at sites owned by project partners Hanson Cement, part of the Heidelberg Group, Bioenergy Infrastructure Group (BIG), Glass Futures and one of their member sites Pilkington UK.

CCSCUs will be deployed across the cement industry, in the Energy from Waste (EfW) sector and – in a world first – the glass industry. The aim is to demonstrate that a low-cost, carbon capture technology is a credible solution in reducing carbon emissions.

Carbon capture is seen as a "game changer," as

Researcher at C-Capture's premises

it uses less energy than available technology. According to C-Capture CEO Tom White this means it can significantly reduce the cost of carbon capture to a point that makes it affordable globally. "It is also environmentally benign, well suited to the

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AGENDA

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Integrating Carbon Capture and Utilization (CCU), e.g. through synthesis facilities, with existing CCS plants at industrial plants would bring the operator the additional benefit of turning a pollutant like CO2 into a valuable fuel like methanol.

Mitsubishi tests CCS in gas engine gensets from July

MHI Engineering and MHI Engine & Turbochargers are about to launch a demonstration test on viability and economics of capturing CO2 from gas engine flue gas. A test series will start in July and run over a 10-month period, with the genset installed at an inhouse unit of MHIET's Sagamihara Machinery Works.

Sagamihara Machinery Works, relocated from Tokyo to the town of Sagamihara in 1970, comprises three divisions: one for engine, one for turbochargers and one for special vehicles. The demo testing will evaluate how different consistencies of flue gas from engines used for power generation impact on carbon capture performance. Tests will also look at the makeup of the captured CO2, and options for potential sale and reuse.

The aim is to test, verify and develop a mass-production type system for compact CO2 carbon capture. In focus are also the system's ease of installation, e.g. through a modular approach, and applicability for smaller-scale facilities such as onsite power stations used by energy-intensive manufacturers or the petrochemical industry.

Verification will also be performed on an operation support service utilizing MHIENG's proprietary remote monitoring system. ■

Siemens Energy, Air Liquide to mass-produce H2 electrolysers in Europe

Siemens Energy and Air Liquide have created a joint venture to mass-produce industrial scale renewable hydrogen electrolysers in Europe. Production at a new factory in Berlin is due to start in the second half of 2023, and ramp-up to an annual output of 3 GW is envisaged by 2025.

Air Liquide will take 25.1%, and Siemens Energy will hold 74.9% of the joint venture, whose creation is still subject to regulatory approval. Headquarters of the JV as well as the multi-gigawatt factory that produces electrolysis modules, the so-called "stacks", would be also located in the German capital.

By 2025, annual output at the JV's electrolyser factory in Berlin is meant to reach 3 GW.

The factory will supply stacks to both companies, helping to meet rampant demand from their customers. The stacks will be based on proton exchange membrane (PEM) electrolysis, an efficient technology designed to harvest volatile renewable energy.

"By scaling up the production of large scale electrolyzers, we will be able to provide their customers with access to large amounts of competitive renewable hydrogen and to decarbonize their activities," said François Jackow, Chief Executive Officer of Air Liquide.

Targeting industrial-scale H2 projects

The partnership builds on existing hydrogen projects, and Air Liquide and Siemens Energy target large industrial-scale hydrogen projects. Such order winds would create a solid basis for the required rapid ramp-up of electrolysis capacities which would make competitive renewable hydrogen available sooner.

One of the first large-scale projects is the Normand'Hy electrolyser, with 200 MW in the first phase and built by Air Liquide.

"We want to be a driving force in hydrogen technology," said Christian Bruch, CEO, and President of Siemens Energy AG. "To make green hydrogen competitive, we need serially produced, low-cost, scalable electrolysers. We also need strong partnerships. Together with Air Liquide as a pioneer in hydrogen for over 50 years, we look forward to implementing innovative solutions and collaborating to shape this new hydrogen market."

The partners have and will apply for "large projects" funding under the EU's Innovation Fund, Green Deal, and Important Project of Common European Interest (IPCEI)-scheme for hydrogen, funded by national governments within the EU. ■

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Publisher
Stuart Fryer

Editor
Anja Karl
Tel: +44 (0)7733 684 682
anja@gastopowerjournal.com

New Business & Databases
Stephan Venter
Tel: +44 (0) 207 017 3407
venter@gastopowerjournal.com

Subscriptions
Margarita Tokere
Tel: +33 (0)7 67 62 58 77
margarita@gastopowerjournal.com

Layout & Production
Vivian Chee
Tel: +44 (0) 208 995 5540
chee@btconnect.com

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large-scale capture of CO2 and robust enough to withstand even the most aggressive flue gases. These advantages mean it has potential to break the barriers that are preventing the widespread adoption of carbon capture and storage technology, to mitigate the impacts of climate change," he commented.

Commercial-scale CCS targeted by 2030

As for the partnership with Wood, White said the deal will allow C-Capture deploy its unique solvent across a wider variety of applications with the aim of "demonstrating how the UK is leading the way to develop and export industrial decarbonisation technologies." To that end, engineers will conduct feasibility studies at the three UK host sites for implementation of commercial capture plants and support C-Capture to fabricate modular demonstration carbon capture plants for deployment at the host sites.

If successful, the project will be a stepping stone for both Wood and C-Capture to realise their goal of deploying commercial-scale carbon capture facilities across the three industries by 2030. ■

Car industry opposes EU ban on new combustion engine cars by 2035

The European Automobile Manufacturers' Association (ACEA) has dismissed the EU's new phase-out deadline for combustion engine-based cars. Though carmakers are fine with reducing fleet emissions by 15% in 2025 and by 55% in 2030, they oppose plans to ban new combustion engine cars from 2035, so all new cars would have to be electric by then.

"Given the volatility and uncertainty we are experiencing globally day-by-day, any long-term regulation beyond this decade is premature at this early stage. Instead, a transparent review is needed halfway in order to define post-2030 targets," argues Oliver Zipse, ACEA president and CEO of the German carmaker BMW.

"Such a review will first of all have to evaluate whether the deployment of charging infrastructure and the availability of raw materials for battery production will be able to match the continued steep ramp-up of battery-electric vehicles at that point in time," he underlined.

E-vehicles being charged

Tackling transport emissions key to meet EU climate goals

Transport is the largest source of emissions in Europe, with cars causing 12% of transport emission alone. Environmentalist hence see the 2035 deadline for zero-emission cars and vans as a significant step forward towards tackling air pollution and making electric vehicles affordable.

"Weak benchmarks will not spur enough action by carmakers this decade to help EU member states hit their climate goals," they argue. At its core, the EU climate law requires member states to reduce greenhouse gases by at least 55% compared to 1990 levels by 2030.

On June 28, the EU environmental ministers will be again to decide on their position on car and general transport emissions. Environmentalist keep pressuring governments to confirm the effective end date for sales of new combustion engine cars vehicles and "leave no room for diversions into fake green solutions like e-fuels."

A final law is expected to be agreed this autumn, and become effective shortly afterwards. ■

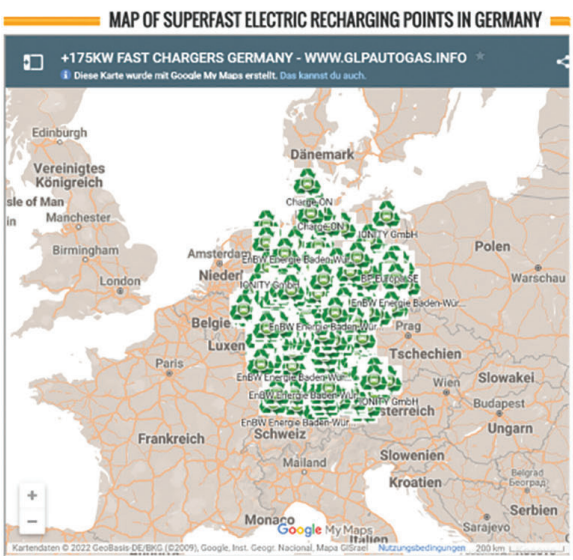
Germany needs just a fraction of planned e-car charging stations; BDEW

German Energy Industry Association BDEW has dismissed government plans for the rollout of e-car infrastructure as "greatly exaggerated." Criticism centres around the target of installing 1 million public e-charging points by 2030, to enable having 15 million e-cars on the road while BDEW says demand for around 250,000 chargers is "much more realistic."

In fact, most people are expected to charge at home or at work, and the share of rapid chargers increases which reduces the need for a great number of public e-charging points.

The energy industry hence warned policy makers against "oversteering" through state subsidy programmes instead of private sector investments and called for realistic targets instead.

"It is certain that the 'one million' figure is far beyond the realistic need for charging points and creates false expectations among consumers," said BDEW head Kerstin Andreae. "This figure creates great uncertainty and thus becomes a barrier to entry. Potential e-mobilists need to have a realistic idea of how many charging points are actually needed nationwide in order to make a purchase decision.



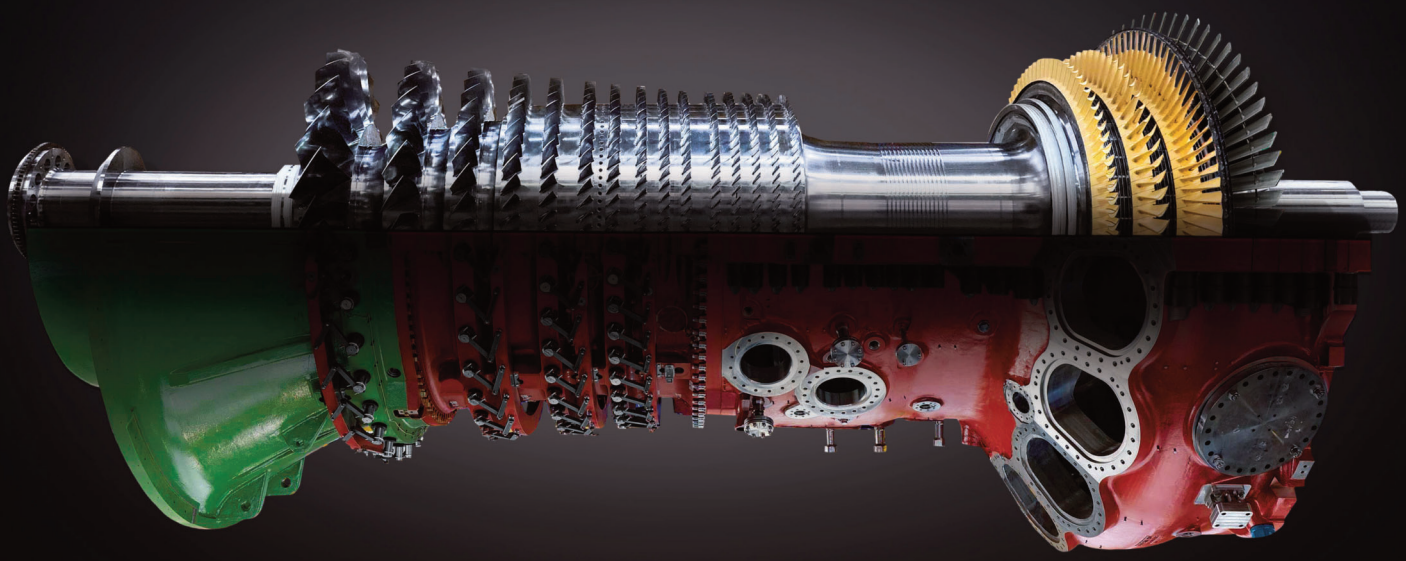
Chicken-and-egg problem

It's a chicken-and-egg problem. Comparatively small numbers of electric cars provide little incentive for building chargers, while concerns about a lack of charging infrastructure prevents people from buying e-cars. Unrealistic targets, on the other hand, educe public acceptance and risk to slow down the end-user's switch to electric cars. Excessive targets also mean unnecessary state spending.

Andreae acknowledged, however, it is impossible to determine exactly how many charging points will be needed in 2030, as this figure depends on how many electric cars will be on the roads, how fast they can be charged, and on how many people will regularly need public charging points. ■

ITALIAN ENERGY

BRIGHTER FUTURE



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Europe's LNG demand to outstrip supply by year-end; Rystad finds

Though Europe's drive to diversify gas sources has spurred a rush of new LNG projects, demand is expected to outstrip supply by year-end, constraining gas-fired power generation. Construction timelines mean material relief is unlikely before 2024, Rystad Energy said, forecasting global LNG demand will hit 436 million tonnes in 2022 while available supply stands at just 410 million tons.

In the wake of Russia's invasion into Ukraine, the European Union has set an ambitious target to reduce dependence on Russian gas by 66% within this year – an aim that seems to clash with the EU's goal of replenishing gas storage to 80% of capacity by 1 November. Considering Russia last year sent 155 billion cubic meters (Bcm) of gas to Europe, providing more than 31% of the region's gas supply, analysts reckon that "replacing a significant portion of this will be exceedingly difficult," analysts commented.

Sustained supply deficit, high prices

"There simply is not enough LNG around to meet demand. In the short term this will make for a hard winter in Europe. For producers, it suggests the next LNG boom is here, but it will arrive too late to meet the sharp spike in demand. The stage is set for a sustained supply deficit, high prices, extreme volatility, bullish markets, and heightened LNG geopolitics," said Kaushal Ramesh, senior analyst for Gas and LNG at Rystad Energy.

Moreover, the EU's target to lower Russian gas and LNG imports from current levels of between 30% and 40% could alter the global trade flows for years to come. Exporters, particularly in the United States, have been rushing to source more supply: More than LNG 20 projects with a combined capacity of over 180 million tonnes per annum (mtpa) have reported some development progress. But to be certain of LNG supply in 2030, the market will need more than 150 mtp of production from the 186 mtpa planned, meaning more than 80% of the project pipeline must be realized.

Analysts at Rystad Energy expect Europe will be able to lower Russian gas imports by 37 Bcm this year, rising to over 100 Bcm by 2030. As a result, Europe's gas consumption in the industry and power sector has likely peaked in 2019 and is now in steady decline. But as the role of gas in Europe's energy mix declines, renewables as well as coal and new nuclear will have to make up for the short-fall in readily available power generation capacity.

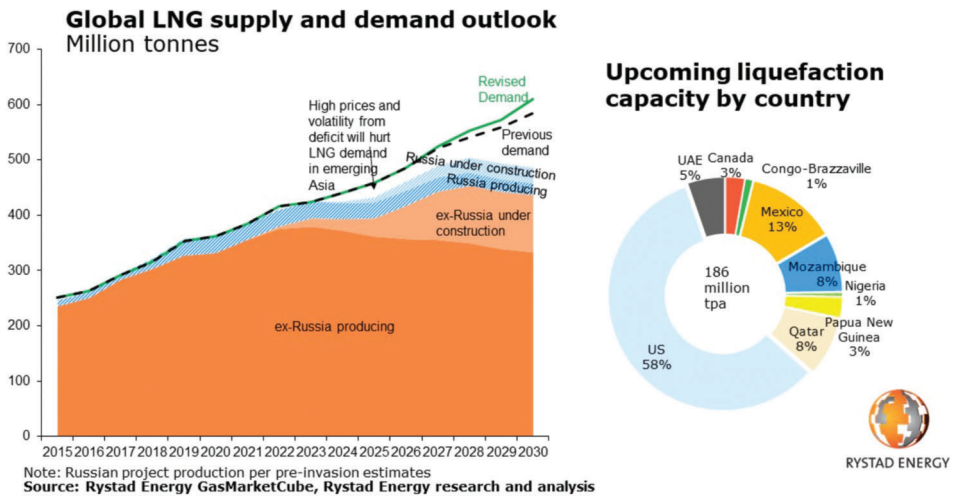
Reversing plans

In fact, Europe was on course to increase Russian imports of gas and LNG to over 40% of its supply by 2030, if the now stalled Nord Stream 2 pipeline had been approved. Instead, these plants have been totally reversed and Russian pipeline gas volumes will now drop to around 20% by 2030 as current contracts with Gazprom are not renewed.

"If Russian flows were to stop tomorrow, the gas currently in storage (about 35% full) would likely run out before the end of the year, leaving Europe exposed to a brutal winter," Ramesh warned. Under this scenario, in the absence of joint buying arrangements of EU countries, the TTF gas price could climb to more than $100/MMBtu, resulting in industrial curtailments and widespread fuel switching in the power sector.

"We have already seen curtailments to fertilizer, steel and paper manufacturers in Europe, underscoring the economic pain that awaits," he said, suggesting. "In an extreme scenario of a severely cold winter, not even the residential sector would be safe."

While European buyers seems to be prepared to pay almost any price for LNG and non-Russian pipeline gas, the higher prices have slowed Asian LNG demand growth which means the continent will remain dependent on fuel oil and coal. In some scenarios, Asian LNG demand may be permanently dented, and deployment of renewables accelerated. ■



NEWS NUDGES

EIA expects nine GOM fields to start in 2022

US government analyst expect nine oil and natural gas fields in the Gulf of Mexico (GOM) to come into operation in 2022, which are projected to account for 5% of gas production and 14% of oil production in the US by the end of 2023. GOM natural gas production will average 2.1 billion cubic feet per day (Bcf/d) in 2023, down 0.1 Bcf/d from 2022, analysts noted while crude oil production is seen rangebound at 1.8 million barrels per day (MMb/d) this year and in 2023.

US E&P firms boost reserves but spend less

Financial reports by 119 traded exploration and production (E&P) companies show aggregate proved reserves of crude oil and natural gas have rising by 19.2 billion barrels of oil equivalent over the course of 2021, largely due to higher commodity prices globally. The evaluated firms collectively spent $244 billion on exploration and development last year, which is 28% less than the pre-pandemic five-year (2015–19) average.

Gazprom and Novatek to 'sustainably' develop Russian Arctic

Russia's state-owned Gazprom and independent gas company Novatek have signed a cooperation agreement on the sustainable development of the Arctic zone of the Russian Federation. Novatek, founded in 1994, owns oil and gas fields and license areas primarily in the Yamalo-Nenets autonomous area – the world's largest natural gas production region, home to 80% of Russian gas production and approximately 15% of global production. ■

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ACWA Power reconfigures Shuaibah-3 IWPP to reverse osmosis plant

Saudi Arabia's leading developer and investor ACWA Power has agreed to restructure Shuaibah 3 Independent Water and Power Plant (IWPP) from an energy-intensive power gen unit and thermal desalination plant to a greenfield seawater reverse osmosis (SWRO) unit. The move shows the growing need for drinking water in the Saudi kingdom.

ACWA Power, together with Shuaibah Water Electricity Company (SWEC), and Saudi Water Partnership Company (SWPC), the off-taker of Shuaibah 3 IWPP, signed an agreement to convert the plant by 2025, aiming to save nearly 45 million tons of carbon dioxide emissions and 22 million barrels of light crude oil annually.

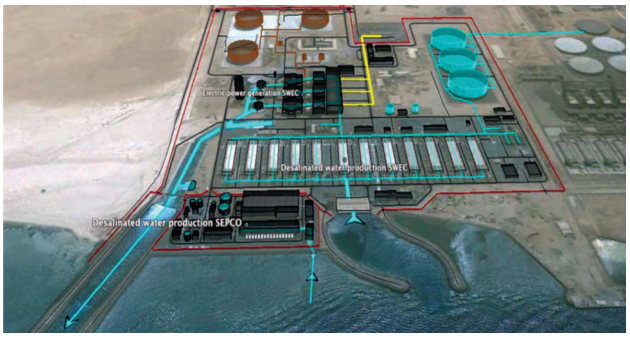
Turing the oil-fired power gen unit into a seawater reverse osmosis plant will significantly lower the carbon footprint of its operator SWEC – in line with government plans to diversify the country's hydrocarbon-focussed economy by investing in green fuels as well as Saudi Araba's pressing need for drinking water and alternative, green power sources.

Start-up slated for Q2-2025

Shuaibah 3 IWP is expected to be commercially operational by the second quarter of 2025, with developers hoping that the financial returns of the contracted revenues will materialise during the same period.

Upon completion of the project, Shuaibah 3 IWP will produce 600,000 cubic metres of water a day, catering to the water demand of Jeddah and Makkah al-Mukarramah, especially during peak demand periods such as the Holy Month of Ramadan and the Hajj seasons.

Local content of the project will amount to 40% in the construction phase; 50% in the operation and maintenance phase for the first five years; and will eventually increase to 70% over the project's lifetime.



Render of Shuaibah 3 IWPP

RO tech cuts plant's power need by 70%

Technically speaking, Shuaibah 3 IWP will utilise the latest reverse osmosis technologies to ensure high production efficiency and reliability. Developers promised the plant will "produce drinking water at record-low electricity consumption" and will be partially powered by solar PV, leading to about 45% less electricity consumption from the grid and lower emissions.

The switch from thermal to reverse osmosis will reduce the electricity needed to desalinate seawater by 70%, developers specified. ■

BASF expands production capacity for battery materials in China

BASF Shanshan Battery Materials, majority-owned by the German chemicals giant BASF, has invested to expand the production of cathode active materials in Changsha, Hunan Province, where it manufactures manganese-rich products at a multi-ton scale. Both raw materials are in high demand from the electric vehicle industry and can also be used for energy storage.

Through the expansion project, BASF Shanshan Battery Materials, (BSBM) will produce 100 kilo-tons (kt) annual capacity for cathode active materials. This was achieved by implementing new standards in process design and dust control as well new processes achieve a higher throughput. The new flexible production lines at the Changsha factory can manufacture a product portfolio ranging from high-nickel and ultra-high-nickel nickel-cobalt-manganese oxide (NCM) for polycrystalline and single crystalline, as well as manganese-rich NCM products.

Commissioning of the new lines will start from the fourth quarter of 2022. ■

At BSBM's Changsha site, the new lines due operational before year-end

GE helps lower CO2 footprint of Australian gluten producer

GE's aeroderivative LM2500 gas turbines have been ordered by Manildra Group to reduce the emission footprint of its Shoalhaven Starches industrial process in Bomaderry, New South Wales. Coal-fired boilers at an onsite combined heat and power (CHP) plant will be converted to gas-fuelled operations, reducing emissions by up to 40% starting from early 2023.

First equipment arrived on site on the June 15 to facilitate a timely completion of the turnkey project. The remaining equipment will subsequently be delivered, notably two LM2500+ aeroderivative gas turbines, two Heat Recovery Steam Generators (HRSG) with fresh air firing and associated Balance of Plant to deliver up to 54 MW of electricity and 210 tons per hour (TPH) of steam on a continuous basis.

Family-owned Manildra Group produces a range of food and industrial products, including wheat flours, bakery mixes, ethanol, starches, syrups, stockfeed and more. Shoalhaven Starches is the largest wheat starch and gluten plant of its kind in the world and its manufacturing process use the entire wheat grain, relying on heat (from steam) production to power the site. ■

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