



South Korea about to select winning bidders of H2 power gen tender

Industry is awaiting the South Korean government's announcement of winning bidders of the first round of a tender for hydrogen-based power projects, expected to be disclosed by the end of August. Total volume of the tender is 1,300 GWh and the first round, held in early June, was aimed at allocating half of this volume.

The government in Seoul hailed the initiative as "the world's first hydrogen power generation bidding market" as the country seeks to shift away from nuclear power. The new bidding market is meant to allow utilities sell electricity generated from hydrogen or hydrogen-compounds such as ammonia to Korea's state-run power distributor KEPCO and other regional operators. Policy makers are also in talks about purchasing the clean-burning fuel from Oman and Australia.



Daesan H2 power plant

Trio runs gas turbine on 60% hydrogen blend

Shattering an industry record, PSM, Thomassen Energy and Hanwha Power System just operated a gas turbine with a 60% hydrogen blend at baseload condition. The result was achieved at a purpose-built power plant in Daesan, South Korea, where a Frame

7E turbine was refurbished with PSM's FlameSheet Combustor Platform, an upgrade for B-, E- and F-Class gas turbines.

The turbine at Daesan used a mixture of natural gas, hydrogen and hydrogen-containing gas from a nearby petrochemical site,

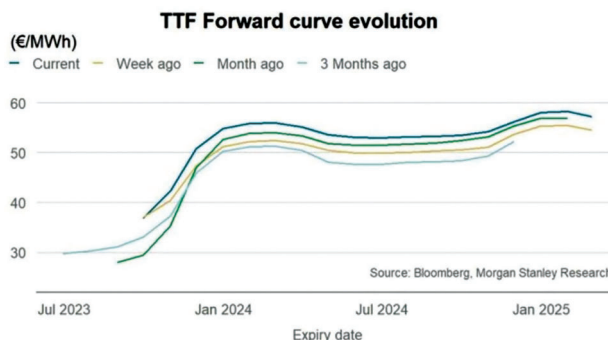
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Possible strike among Australian LNG workers make TTF prices rally

Prices at the Dutch TTF, Europe's most liquid gas trading hub, have rallied on a possible strike among LNG workers in Australia and longer-than-expected field maintenance in Norway. Notwithstanding ample storage, the front-month TTF future soared nearly 20% with Morgan Stanley calling the rally "overdone" – though if these prices were to stick they could cost consumers \$14 billion this winter.

Despite weak demand and ample supply, TTF prices rallied driven by fears of a repeat of last year's gas shortages though there is little cause for such concerns. Weather-adjusted demand is around 15% below previous five-year seasonal averages, supply of Norwegian pipeline gas has recovered after the maintenance and gas storages are nearly 87% full – the highest level on record for this time of the year.

Still, the TTF forward curve has moved upwards, figures compiled by Morgan Stanley Research show, largely due to news that workers at Woodside's 16.3 million tons per annum (mtpa) North West Shelf complex have voted in favour of a strike to



achieve better pay and job security. Moreover, workers at Chevron's 15.6 mtpa Gorgon LNG plant and the 8.9 mtpa Wheatstone LNG plant are also holding a ballot on industrial action with results expected on August 24 and August 28, respectively.

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jointly owned by Hanwha and TotalEnergies.

Initial tests were at baseload condition, dry with 60% hydrogen by volume and achieved single-digit ppm emissions of oxides of nitrogen (NOx) and carbon monoxide (CO). Fuel delivery was provided by a

proprietary-designed blending system, "enabling turbine testing at even higher volumes in the future," the trio suggested.

Korea's Hanwha Power System, as well as Florida-based PSM and Thomassen Energy of the Netherlands, deliver aftermarket

services for multi-OEM platform gas turbine power plants. The trio aims to provide their own technology-enabled solutions that improve operational performance, fuel flexibility and maintenance life cycle costs for the asset owners. ■

Credit ratings underplay climate-related risks; analysts warn

Climate-related risks affect creditworthiness – an issue of grave concern to bond markets participants who value stability. S&P Global Ratings expects the impact will accumulate over time, though it has taken very few climate-related rating actions since early 2022 due to the gap between policy pledges and the tangible effects of regulations, as well as companies' so far limited spending on decarbonisation.

All three big rating agencies caution about the impact of climate-related risks on credit ratings: Fitch, for starters, indicated that about 20% of global corporates – mainly oil and gas producers, and pipeline and energy midstream companies – could be downgraded by 2035 due to exposure to climate vulnerabilities.

In a scenario analysis of an orderly energy transition, S&P found that by 2050 airlines, automotive, metals and mining, oil and gas, and power generation faced a 31% to 54% downgrade risk. A disorderly

transition would raise the credit downgrade risk further by 2% up to 20%, implying more severe financial and credit risk implications – particularly for power generation and oil and gas.

Risk of sudden downgrades

Moody's, meanwhile, warned that sectors with high or very high inherent climate risk – including oil and gas, automobile manufacturers, utilities and power generation – accounted for 10% of total rated debt outstanding. These sectors were similar to those later identified by Fitch and S&P. The

risk is expected to exacerbate as the low-carbon economy transition gained traction and the negative effects of physical climate change deepen.

Though climate risks have yet to result in tangible effects, they will likely foster lead to rating volatility and instability – a costly affair for investors. Prudent fund managers would need to transact the same securities with greater frequency, while regulated institutions would have to more closely manage their asset-liability risks and proved higher capital buffers to not be caught out by a sudden downgrade. ■

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Strikes could cause cargo diversions from Europe to Asia

Australia covers over 20% of global LNG supply, with most cargoes headed to Japan and South Korea. The three LNG plants – North West Shelf, Gorgon and Wheatstone – together contribute to just over 50% of Australian LNG exports, which are mainly shipped to Japan and South Korea.

"Should this supply fully go offline, this would likely result in significant redirection of spot LNG volumes away from Europe and towards Asia," Morgan Stanley warned. But given the size of volumes at stake, both Chevron and Woodside are keen to reach a deal with the unions to avoid strikes and prevent disruption of LNG flows. Analysts hence view the risk of full disruptions across all three LNG export plants as "likely low."

With gas inventories now over 90% full in six out of nine of Europe's largest economies, analysts expect the needs of LNG imports to recede to around 140 million cubic meters per day (mcm/d) between September and October to avoid hitting storage constraints. Floating LNG storage would be attractive at a spread of around €26/MWh from September through January to cover costs – though analysts warn all of this "does not provide much buffer."

Price volatility highlights fragility of EU gas supply

A crucial point is that Europe's physical gas system has been set up to suit one large swing supplier: Russia, which was able to provide significant volumes of pipeline gas, even at short notice. In the wake of the

Kremlin's war on Ukraine, "the LNG market has compensated for the loss of Russian volumes to a large extent, but with its more rigid supply chain, LNG cannot provide much short-term swing capacity," analyst pointed out.

Without a large swing-supplier, even full storage does not provide much buffer against even modest supply risks, Morgan Stanley reckons, noting that "hence the outside rally in TTF after the Australian strike risk emerged."

At the moment, TTF prices look likely to trade in the mid-40s (in €/MWh) over the winter, meaning the current forward curve should come down from recent highs in the mid-50s. With the risk of supply disruption from Australia being judged as "relatively modest," analysts reckon that recent TTF gains will reverse but not reach levels of a 'normal' market when prices should be in the mid-30s amid good renewable power output and healthy gas supplies.

But the asymmetric risk of spikes calls for a risk premium on top of this base level. Hence, Morgan Stanley sees TTF prices in the mid-40s over the course of this winter, which partly explains why Europe's industrial gas consumption has been so slow to return. ■

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ADNOC's tortuous path to gas self-sufficiency

Abu Dhabi National Oil Company's (ADNOC) transformation to become a self-sufficient gas player by 2030 includes plans to build two new LNG trains in Ruwais, the partial floating of ADNOC Gas and the offer to take NewMed Energy private with BP. For long, Abu Dhabi had been importing 19.bcf/d gas through the Dolphin pipeline to fuel power and desalination plants – now it seeks to tap challenging resources.

With the Dolphin contracts set to expire in July 2032, Abu Dhabi seeks to harness its own resources to grow production. In WoodMac's worst case scenario, the UAE could face gas shortages as early as 2027 – long before Dolphin contracts expires. ADNOC hence examines all options, including more costly and complex ultra-sour gas, unconventional shale gas and gas cap developments.

"Gas shortages push ADNOC to choose between its 5 million b/d oil target, its gas self-sufficiency goal and its LNG ambitions," analysts reckon, stressing that to achieving its gas self-sufficiency target would require mega upstream investment, fast-tracked execution and strong operational performance.

Keen to reduce its reliance on imported gas, the UAE is decreasing gas-burn for power generation by shifting its energy mix more towards nuclear and solar power. In 2024, the total nuclear capacity will increase to 5.6 GW, displacing the equivalent of 1 bcf/d of gas, Wood Mackenzie forecasts, anticipating the UEA's domestic gas demand to remain flat in the short to medium term.

Spin-off and partial listing of ADNOC Gas

To consolidate its gas processing and LNG businesses, ADNOC established a separate gas unit and then listed a 5% stake in ADNOC Gas in March 2023 and raised US\$2.5 billion. In April 2023, ADNOC and BP made a US\$2 billion non-binding offer to take

East Mediterranean-focused NewMed Energy private. "This is ADNOC's first international upstream deal and positions the company as a global gas player with access to the East Mediterranean

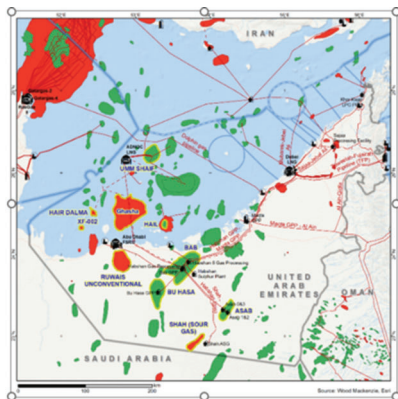
gas market," analysts commented.

In 2028, the gas output will soar at the expense of reinjected volumes as the new LNG export facility in Ruwais is set to start operation. The planned 9.6 mtpa LNG facility will need an additional 1.5 bcf/d of feedgas. Analysts warn Abu Dhabi "could then face gas shortages if no new project comes on stream by the end of the decade and the Dolphin contracts are not renewed."

Quest to tap technically challenging fields

New gas developments are the answer, though most of them are costly and technically challenging. High cost led to the recent cancellation of pre-construction service agreements for Hail and Ghasha, two ultra-sour offshore fields from which ADNOC was targeting 1 bcf/d of gas sales. In addition, the company is hoping to produce 1 bcf/d from Ruwais Unconventional by 2030 and gas caps at the giant Umm Shaif and Bab field also contain significant resources.

Going forwards, ADNOC will have to act prudently as the simultaneous development of both oil and gas could lead to pressure imbalances and the potential loss of oil production. Moreover, non-associated gas sources are all deemed expensive and will lead to significantly higher costs of feed gas for the new Ruwais LNG plant. ■



UAE gas fields and infrastructure



Gas-burn could fall 4 Bcm as solar build-out narrows thermal gap

Power-sector gas demand in Western Europe could dwindle to 42 Bcm in the second half of 2023, down 4 Bcm year-on-year, as the rapid build-out of solar capacity contributes to a "weak call on thermal generation," Energy Aspects reckons. Strong build-out in embedded solar capacity weighs on power load, narrowing the thermal gap while low gas prices trigger fuel switching.

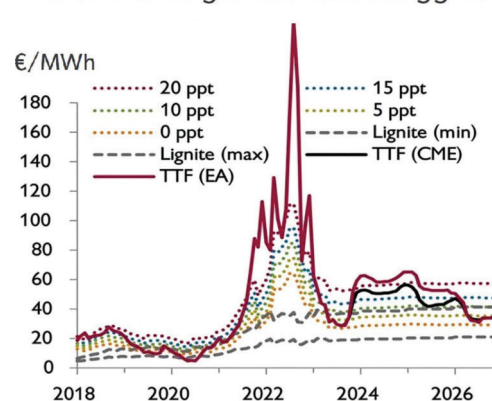
The Aug-23 contrast at the Dutch TTF gas trading hub settled at €25/MWh, a good €3/MWh below analysts' forecast for outturn prices this month. Europe is expected to fill storage inventories to 104 Bcm by end-October, while still maximising power-sector coal-to-gas switching, analysts said, suggesting "price risk is skewed to the downside given limited price sensitivity below the bottom of the fuel-switch channel (see graph)."

"Europe could import 40 fewer LNG cargoes and still fill underground storage above 100 Bcm," analysts noted. given that storage ended July at above 92 Bcm – 17 Bcm

higher than the five-year average.

The record contango of prices going into the winter – Q1-24 prices were €23/MWh above the balance of Q3-23 on 28 July – triggers gas companies to maximise the storage fill to their declared available capacity of 107 Bcm. "Pricing at the 5 ppt fuel-switch trigger in August reduces power-sector gas demand by 0.9 Bcm and will conceivably translate into almost 1 Bcm of additional injections," analysts noted. But they warned "this will decrease expected low injection demand in September–October, which threatens a much weaker TTF than currently forecast later in the injection season." ■

TTF vs coal-to-gas fuel-switch triggers



Source: Bloomberg, Refinitiv, CME, Energy Aspects

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New nuclear and renewables cover more of US summer demand peak

With the start-up of the new 1,114 MW Unit 3 at Georgia's Vogtle nuclear power plant, more of America's peak electricity demand this summer is covered by zero carbon energy sources. Government analysts anticipate 4.5 TWh more nuclear generation this summer than in summer 2022, complemented by fast-growing solar and wind power capacity and gas peaking plants.

Vogtle Unit 3 is the first new nuclear reactor to start up in the United States since the Tennessee Valley Authority's Watts Bar 2 was commissioned in 2016. The plant's first two reactors, with a combined 2,430 MW of nameplate capacity, came online in the late 1980s and Georgia Power expects Vogtle Unit 4, with another 1,114 MW, to begin operation sometime between November this year and March 2024.

Interest in new nuclear power is gaining traction as the carbon-free energy source can provide essential baseload power that would otherwise largely come from coal-

and natural gas-fired plants. With 95,881 MW of nuclear power capacity at 93 operating commercial reactors, the United States already has more nuclear capacity than any other country, producing nearly 20% of overall electricity supply. Recent legislation, such as the Bipartisan Infrastructure Law and the Inflation Reduction Act, supports U.S. nuclear energy as part of a zero-carbon generating portfolio.

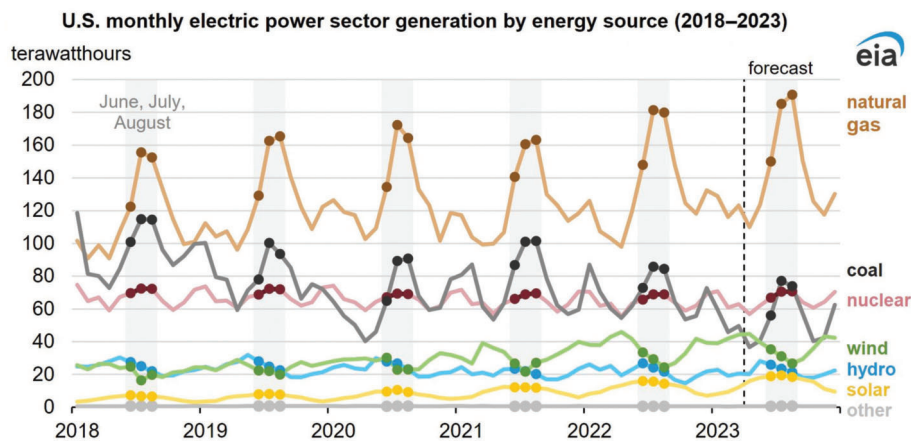
Clean energy and gas curb coal-burn

New nuclear capacity, combined with a rising contribution from solar, wind and gas-

fired power plants are greatly scaling back the need for dispatching coal-fired plants this summer. According to US government figures, the electric power sector added an estimated 14.5 gigawatts (GW) of solar generating capacity and about 8.0 GW of wind capacity during the 12 months ending May 31, 2023.

Texas and California are home to most of the solar-powered growth, and the U.S. Energy Information Administration (EIA) expects new solar capacity will lead to a 24%, or 10.8 TWh increase in solar generation this summer compared with last summer. "Many solar projects are also being built with associated battery storage systems to help provide power when solar and wind resources are low," analysts noted, pointing out an estimated 5.3 GW of battery capacity was added over the past twelve month – a nearly 90% increase.

Strong contribution from solar, wind, and nuclear power will contribute to reduced generation from coal-fired power plants this summer. Between June 2022 and May 2023, about 11 GW of U.S. coal capacity retired, and EIA analysts hence expect 15%, or 36.0 TWh less coal-fired generation in the United States this June, July and August compared with last summer.



Data source: U.S. Energy Information Administration, *Short-Term Energy Outlook*, June 2023

MAN to deliver FEED study for 200 MW Power-to-X plant in Finland

Finish utility Koppö Energia has commissioned MAN Energy Solutions to deliver the front-end engineering design (FEED) for the methanation reactor of an industrial-scale power-to-X plant in Kristinestad. Once completed the plant will convert 200 MW of primarily wind power into green hydrogen through electrolysis, and ultimately into liquefied synthetic natural gas (SNG) through methanation.

The SNG will be sold to continental Europe and be used to decarbonise the continent's heavy-duty transport sector.

Koppö Energia – a joint venture between the German alternative energy asset manager Prime Capital and green power producer CPC – plans to place the order for the delivery of the reactor system in 2024. Beforehand, the Deggendorf team of MAN Energy Solutions will carry out the FEED of the methanation reactor, which will eventually produce 55,000 tonnes of SNG annually.

The new PtX plant is part of the Koppö energy cluster, which also includes the parallel development of up to 500 MW of wind power and 100 MW of photovoltaic power

that will supply the plant with large volumes of renewable energy in the medium term.

Norbert Anger, site manager at MAN Energy Solutions Deggendorf said the company is already a power-to-X pioneer in Europe. "Back in 2012, we commissioned the methanation reactor for what was, at that time, Europe's largest power-to-gas plant with 6 MW in Werlte, Germany." He expressed pride that the solution is now planned to be used on an industrial scale.



Render of PtX-plant in Kristinestad

"We urgently need synthetic fuels in large quantities if the decarbonisation of global supply chains is to succeed," Anger concluded.

AGL about to start up 250 MW energy storage at Torrens Island

Australia's AGL Energy and Wärtsilä are preparing the grid-connection and start-up of a 250 MW/250 MWh energy storage system (ESS), installed at the site of Torrens Island B power station that is up for closure in June 2026. The battery will be used to backup renewables, together with a new 210 MW power unit based on twelve reciprocating gas engines.

AGL decided to close its loss-making 1,280 MW gas-fired power station Torrens Island B in South Australia nearly ten years earlier than planned. The closure date on June 30, 2026, will coincide with the completion of the state's new 800 MW interconnector with New South Wales, built by EnergyConnect. The government insisted Torrens Island B needs to keep running until the interconnector is ready, and AGL will receive AS\$19.5 million to keep 200 MW of gener-

ating capacity operational as a contingency reserve.

Battery to operate in grid-forming mode

Energy storage is a key option to balance rising volumes of fluctuating wind and solar power supply in South Australia with the state's electricity demand. Torrens Island energy storage will first operate in grid-following mode and later transition to grid-forming mode (virtual synchronous genera-

tion – VSG) which enables faster response times.

AGL chief executive Damien Nicks pointed out the battery was constructed within 18 months – “a great example of what can be achieved when government, regulators and the private sector are all working together.” The project, in his view, helps AGL accelerate the build out of up to 12 GW of renewable and firming capacity by 2035.

“Australia's energy transition is all about balance. Wärtsilä is partnering with AGL to help balance intermittency of renewables and provide flexible energy capacity, while reducing their operational and lifetime costs,” said Andrew Tang, Wärtsilä's vice president of Energy Storage & Optimisation. Prior to the Torrens Island ESS project, Wärtsilä supplied a 211 MW balancing power plant for AGL, the Barker Inlet Power Station, also located on Torrens Island. The company is also delivering a 460 MW battery in partnership with Origin, at the Eraring Power Station in New South Wales. ■



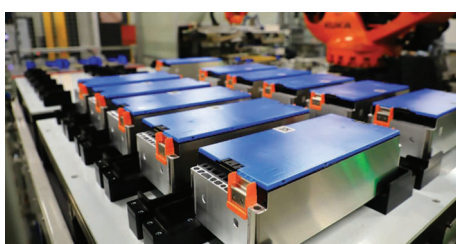
Lishen selects Siemens software to scale up Li-ion battery production

Lishen Battery, a Chinese developer and manufacturer of lithium-ion batteries, has entered a strategic agreement to use Opcenter software from Siemens Xcelerator portfolio to scale up production. The Tianjin-based company delivers comprehensive power solutions to customers and Xcelerator will make its manufacturing centre more competitive by connecting all relevant data – from product design, testing and simulation, to production.

The Chinese government plans that by 2025 energy storage will enter the large-scale development stage, given that system costs are anticipated to fall by more than 30% through improved technology performance. Wood Mackenzie reckons that demand for energy storage will reach 442 GWh in China, compared to 600 GWh in the U.S. and just 159 GWh in Europe, where the “grid-scale market struggles to stabilise.”

Xcelerator is a tool to establish traceability and transparency of key data along the value chain. Tong Lang, board chairman of Lishen Battery is convinced that the collaboration with Siemens will “harness the potential of digitalisation to revolutionize [Lishen's] management system and drive our pursuit of high-quality battery development.”

Software to create a digital twin enables companies to optimize their design, engineering and manufacturing processes which, in Lishen's case, is mean to contribute to the rapid development of the



Production line of a Lishen-made batteries

global battery industry. “The key to improving the competitiveness of the manufacturing industry lies in the deep integration with digital technology,” said Leo Liang, Siemens Digital Industries' managing director for Greater China.

Siemens offers a full suite of battery software and factory automation to build and launch Giga-factories in record time and scale production rapidly. Solutions range from accelerated development of battery chemistry, cells, modules and packs to smart manufacturing of lithium-ion and other battery cells to fast ramp-up of machine engineering capabilities. ■

NEWS NUDGES

Rolls-Royce Power System sales up 24%

Underlying sales for Rolls-Royce's Power Systems business unit increased 24% to £1.8 billion (€2 billion*) in the first half of 2023, though order intake declined 14%. Key awards in the period included follow-up orders for rail power packs from Hitachi, marine engines for yacht builder Ferretti and a contract to supply mtu generator packs to the US Navy.

New funding guidelines for clean energy

New guidelines allow Germany's federal government and states to financially support the production of batteries, solar panels and heat pumps without having to get an individual EU permission on state aid rules. The regulation has been approved by the European Commission as part of its 'Temporary Crisis and Transition Framework'.

CVP Three Rivers starts delivering 1.2 GW of electricity to PJM market

Competitive Power Ventures' (CVP) Three Rivers Energy Center has started to deliver more than 1.2 gigawatt (GW) of electricity to the PJM market, enough to power more than 1.25 million homes in Northern Illinois. Three Rivers is GE Vernova's third HA-turbine powered project developed with CPV in the United States.

“Over the many years we have collaborated with GE Vernova, we value the company's advanced technology, services, and strategic financing capabilities,” said CPV's chief executive Gary Lambert. The Atlanta-based utility strives to deliver projects that provide “safe, reliable, cost effective and environmentally responsible power generation,” he underlined.

The new plant consists of two generating blocks, each including a GE 7HA.02 gas turbine, an STF-A650 steam turbine, a W84 generator, and GE's integrated Mark VIe control system. The overall configuration allows the combined-cycle plant to run at a lower output to reduce the need to shut down during low grid demand hours thus reducing cyclic load maintenance. The power gen equipment is being remotely

supervised by GE's Monitoring & Diagnostics (M&D) Center in Atlanta.

Three Rivers is GE Vernova's third H-class combined-cycle power plant developed on behalf of CPV. For the first project, CPV Towantic Energy Center in Connecticut GE Vernova worked with CPV to develop and deliver over 800 MW of cost-effective power gen in New England. The second project, CPV Fairview is able to generate enough electricity to meet the needs of more than 1 million Pennsylvania homes and offset CO₂ emissions equivalent of taking some 360,000 cars off the road each year. ■



CVP's Three Rivers Energy Center

Mass Global vows to get 1.7 GW Mintia power plant ready before 2027

Mass Global Energy Rom, part of Iraq's Mass Holding, is striving to get the 1,700 MW Mintia combined-cycle power plant in Romania started up before 2027. The CCGT is being developed by Siemens Energy at the site of a former coal power plant, with Romanian energy minister Sebastian Burduja convinced construction will be ready before the end of 2026.

Situated some seven kilometres from Deva in Romania's Transylvania region, the Mintia CCGT will be fuelled by domestic natural gas and replace a retired coal-fired power station, slashing CO₂ emissions by more than 50% when completed. With a maximum efficiency of over 64%, it will be one of the most fuel-efficient gas-fired power plants in Europe once completed.

Ahmad Ismail Saleh, owner of Mass Global Energy Rom said the new power plant will mark the beginning of the decarbonization of the region's former coal-fired power generation. “planned simple-cycle operation [will be] by the first half of May 2025,” he specified, “and combined-cycle completion will start in the first quarter of 2026.”

Siemens Energy has been contracted to



Mintia coal power plant will be replaced by an efficient CCGT

supply two HL-class turbines and related equipment for the Mintia CCGT. Scope of supply includes two gas turbines of type SGT5-9000HL with associated generators, an SST5-5000 steam turbine with SGen-3000W generator, and the SPPA-T3000 control system. In the 50Hz market, it is the manufacturers first HL-class power project in a 2x1 multi-shaft configuration whereby the waste heat from two gas turbines is used to drive a steam turbine to increase overall efficiency. ■

Baker Hughes' LM9000 gas turbine to power Commonwealth LNG

US contractor Baker Hughes has agreed to work with Commonwealth LNG on maximizing the project's output through the use of Baker Hughes' LM9000 aeroderivative gas turbine technology – the most efficient in the 65+MW range. The equipment order will be granted in conjunction with financial close on the Commonwealth LNG project, scheduled for the first quarter of 2024.

Commonwealth LNG is an 9.3 million tons per year (mtpa) liquefaction and export terminal project located on the Calcasieu River at the Gulf of Mexico near Cameron, Louisiana. Developers strive to lower capital cost and get the venture into production in early 2027.

Apart from the fast-ramp LM9000 gas turbine, Baker Hughes will also provide compressors, spare parts, maintenance services and its Cordant Asset Performance Management suite to ensure stable and cost-effective operation of the liquefaction plant.

Earlier this month, Commonwealth LNG announced a deal with private funds handled by Kimmeridge Energy Management Company to source capital for the project. The two partners agreed in principle on the terms for a 2 mtpa offtake deal from the new terminal, for a 20-year period. In return, Kimmeridge would provide an undisclosed amount of equity to help advance construction works. ■

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