



UK energy market becomes more susceptible to volatile LNG prices

The dramatic rise Asia's spot LNG price in mid-January and subsequent decline has greatly impacted prices at the UK's National Balancing Point (NBP) gas trading hub. Analysts observe that UK gas and electricity prices have become more sensitive to increasingly volatile global LNG markets.

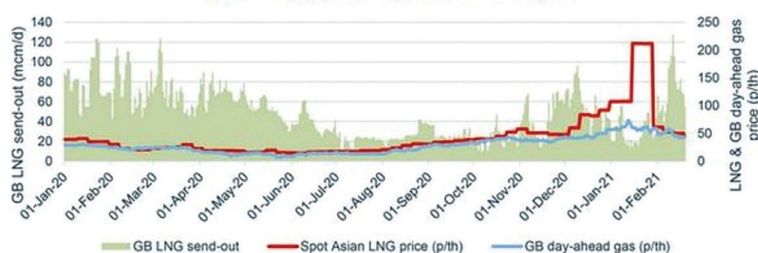
“As the spot Asian LNG price soared, GB day-ahead gas prices reached their highest level in three years, hitting 73.50 pence per therm (p/th) on 12 January, whilst gas contracts along the forward curve also saw significant price growth,” said Sam Peek, analyst at Cornwall Insight.

“This impact also fed into the GB power market, with day-ahead power prices soaring (although this was also due to tight power supply margins). Power contracts along the forward curve also saw significant growth. As gas-fired power stations remain the marginal generators in the power market, movements in gas prices remain important for electricity prices.

“The susceptibility of GB and European gas markets to global LNG prices may be set to increase. With no concrete plans for new long-term storage facilities in the UK and declining UK Continental Shelf supplies, it could point to a greater LNG dependency in the coming years.



Figure 1: LNG supply volumes against spot Asian LNG price



“Global competition for LNG may be set to rise. However, future gas demand may be replaced by hydrogen or greater green gas usage that is produced domestically, or even a switch to the electrification of heat.

National Grid's Future Energy Scenarios highlights that, under electrification scenarios, natural gas demand may decline significantly. Under scenarios using hydrogen, the hydrogen itself may come from the reformation of natural gas (known as blue hydrogen), in which case our gas import dependency will remain.”

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GenCell completes design and synthesis of metal-free catalyst

Israel-based GenCell has designed a non-metal based catalyst, following 6 years of research to reduce cost. In the process, GenCell removed the noble metal platinum from its nickel-based catalyst compound, CEO Rami Reshef explained. Instead, it developed a cracker that extracts hydrogen from liquid ammonia to generate electricity by means of alkaline fuel cells.

Scientists at GenCell have synthesized a highly active noble metal-free catalyst to speed up the reactions at the anode and cathode of the fuel cell. Though the catalytic process is identical, the hydrogen-based solution is estimated to significantly reduce the manufacturing cost of each fuel cell stack.

Once hydrogen technology has been commercialized and becomes a widely accepted fuel for trains, airplanes and other modes of heavy transportation, the demand and prices for noble metals is likely to rise dramatically. Hence GenCell's non-palladium based development will be a “prominent competitive advantage to those products that are produced with no noble metals,” Mr Reshef said.

The noble metal-free fuel cell module is currently being tested and is expected to meet the



GenCell site with ammonia tanks in Israel

testing criteria with “performances close to standards,” remarked CTO Gennadi Finkelshtain.

Ammonia-fed fuel cells

Fuel cells made in Israel deliver backup power for utilities, homeland security, healthcare and auto-

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Japan conducts inquiry into price spikes

The Japanese ministry of the economy, trade and industry (METI) is working on a new natural gas supply framework in the wake of recent price spikes.

"The tightening of power supply ... has made us strongly realize once again the importance of LNG as an adjusting electricity source," said Ryo Minami, METI's director-general of oil, gas and mineral resources.

Keen to ensure security of LNG supply in

the future, Mr Minami pledged that METI will rigorously verify factors behind the recent incident, and we intend to take necessary measures to prevent recurrence of a similar incident.

At the height of the cold snap in January, Tohoku Electric and Kyushu Electric have had to purchase expensive spot LNG as they are running very low on gas stocks to fuel their power plants. The two utilities were seen buying late-February cargoes at \$35–40 per MMBtu while the JKM Mar-21

contract was trading around \$10 per MMBtu.

The substantially lower prices for JKM Mar-21 contracts indicates there will be no demand for European reloads and cargoes being diverted from the Atlantic Basin. Analysts expect the intra-basin arbitrage window between the Atlantic and the Pacific Basin to completely close by April. This should also reduce the number of US shipments to Northeast Asia and ease the Panama Canal congestion. ■

Rolls-Royce says revenues of Power Systems will rebound by 2022

Britain's engineering major Rolls Royce announced today its Power Systems unit is expected to recover from the effects of the pandemic by the end of 2021. Revenues will be back to 2019 levels by 2022, the company said, stressing its success in China will allow it to expand its business in Asia.

"The engine programmes we launched in recent years are now maturing and our investment priorities are pivoting towards lower carbon solutions as well as a more equitable balance across our business units. We intend to dedicate approximately 20% of our annual R&D expenditure to low carbon solutions including small modular reactors (SMRs), hybrid, hydrogen and electric power technologies, by 2023," said CEO Warren East when presenting Rolls-Royces

full year 2020 results.

Despite the Covid-related challenges, the company continued to invest organically especially in research related to the adoption of low-carbon technologies. In 2020, approximately 7% of Rolls-Royce Power System's R&D spending was related to low carbon technologies, rising from 4% in 2019.

Some 38% of R&D spent was on developing next generation engines the remainder spent on delivering or enhancing our current product portfolio. Mr East affirmed Rolls-Royce's ambition to enable its customers achieve net zero carbon by 2050, noting "we joined the UN Race to Zero campaign in 2020."

Beyond 2021, Rolls-Royce expects structural growth in the power sector will be once again driven by

global economic growth and the shift towards more sustainable, lower carbon power solutions, most notably hybrid-electric and hydrogen solutions as well as microgrids.

Sale of Bergen engines suspended

The release of Rolls Royce 2020 results comes just one day after the Norway government vetoed the sale of Bergen Engines, a Norwegian engine maker owned by the British company to the Russia-controlled TMH.

Norway's NSM security agency said it is carefully assessing the 150 million-euro (\$178 million) sale announced on February 4.

"There is significant uncertainty in relation to national security interests, and this uncertainty must be dealt with," Justice Minister Monica Maeland told a news conference to announce the suspension. "We don't know which conclusion we will draw." ■



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mated industries. GenCell's proprietary process creates hydrogen from anhydrous ammonia (NH₃), providing electricity for off-grid and poor-grid telecom, as well as rural electrification.

The innovative cracker, developed by GenCell, extracts hydrogen from liquid ammonia to generate electricity by means of alkaline fuel cells. This technology for ammonia-fed fuel cells opens up a near-term solution for a very hard-to-abate application: remote and back-up power, supplied today around the world by the diesel gen-set.

"In the longer term, platinum shortage could limit the production of proton-exchange membrane (PEM) fuel cell manufac-

turers, because all acid-based low temperature fuel cell technologies require platinum or platinum group metals in their construction," CTO Finkelshtain explained. "As alkaline fuel cells do not have this limitation, any restrictions imposed by platinum availability will not affect our company's pricing."

As the technological readiness for ammonia energy rises, so grows the need for strong industry support to implement and scale up projects. With this objective, GenCell has joined the global Ammonia Energy Association (AEA) in October 2020. The aim is to establish credibility for ammonia to energy technologies as a means to reach decarbonization targets across regions and industry sectors. ■

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Rising energy prices, Net Zero target claimed to 'kill' UK steel industry

Steel and other energy-intensive industries have "no future the UK," lobbyists claim, blaming the government's 2050 Net Zero emissions target for the rise in electricity prices. Figures by the industry association UK Steel indicate electricity prices in Britain are between 60% and 80% higher than those in France and Germany.

Lobbyists also say the rising energy costs are caused by new subsidy scheme for new wind farms, solar photovoltaic and other green energy sources which amount to approximately £10 billion per year.

UK Steel also singled out the "substantial impact on prices of high electricity network costs," with grid balancing costs rising due to increase in intermittent renewable power supply. A study, commissioned by the UK steel industry, finds renewable power sup-

ply "is nearly ten times greater in the UK than in France and Germany."

UK network balancing costs (BSUoS), for example, were about £300m a year in the early 2000s, before the dash for renewables, but now amount to nearly £2 billion a year, in large part due to the extreme operational difficulties in managing wind and solar, the study finds.

Electricity prices in Europe, in turn, are nearly twice as high as in the G20 — never mind China and India where industrial electricity prices are estimated to be just a third of UK prices. Hence, UK Steel urges the government to support the sector, possibly by unilaterally reducing taxes for energy-intensive industries.

Solar plus storage on the rise in Germany

Energy economist in Germany, in contrast, are pointing out

that combining green energy sources like wind, solar power with gas generator sets and energy storage does not need to be more expensive than fossil-fuelled power plants.

Germany's various green energy tenders have spurred a run on combined solar and storage, while onshore wind energy tenders tend to be undersubscribed. By launching a special tender that combines fluctuating power sources with energy storage, the Federal Network Agency (BNetzA) encourages hybrid solutions that can help stabilise the power grid.

In the latest green energy tender, a total 1,095 MW of bids were proposed for solar & storage hybrid. As per the October 2020 auction result, they will receive between 1.94 and 5.52 eurocents per kilowatt-hour (ct/kWh) as a fixed premium on top of the wholesale market price.

The government in Berlin has set a target of 65% renewables in electricity consumption by 2030. ■



US gas consumptions falls in 2020 in all sectors, except power gen

Gas end-use deliveries in the United States decreased in three out of four sectors in 2020. The electric power sector consumed 31.7 Bcf/d, a 2% increase from the previous year according to government statistics, as Henry Hub gas prices fell to their lowest point in decades.

Gas-fired electricity generation has been growing throughout the United States, where gas-fired generation replaced much of the lost output from coal power plant retirements in recent years, making gas the largest fuel source nationally. In fact, gas-burn made up nearly 40% of all electricity produced in 2020 and accounted for a greater output than coal and nuclear, the next two largest fuel sources, combined.

Industrial gas consumption, in contrast, fell 2% in 2020 as Coronavirus-related lockdowns and business closures substantially reduced consumption much of the year. According to figures by the US Energy Information Administration (EIA), industrial gas consumption has increased in 8 out of the past 10 years, mainly as a result of growing dry gas production and relatively low prices.

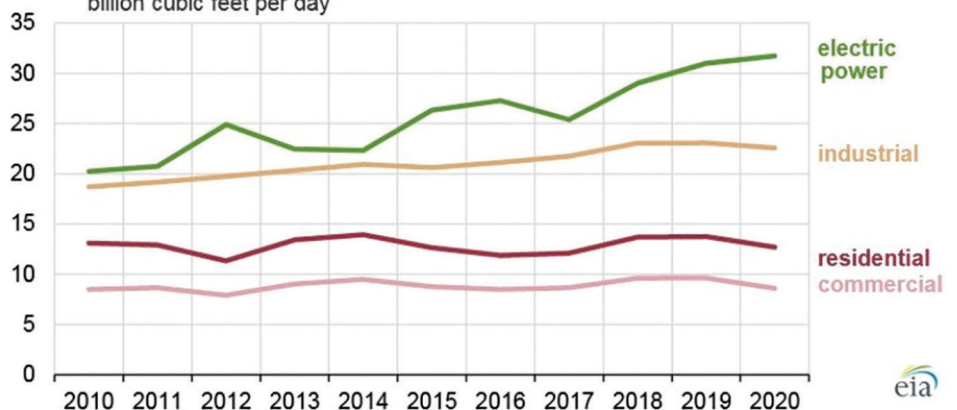
Weather patterns have been the primary drivers of residential and commercial gas consumption, while economic patterns also affect US commercial gas consumption. The winter months of 2020 (January–March

2020 and November–December 2020) were milder than the previous two winters in the United States, resulting in less heating demand. In the commercial sector which includes restaurants, hotels and schools, gas consumption decreased by 11%.

A small amount of end-use gas deliveries go to the U.S. vehicle fuel sector, repre-

senting about 0.2% of total deliveries in 2020. In addition, a substantial volume of natural gas is consumed through producing, processing, and distributing the fuel. Analysts consider these volumes as a component of total consumption, but they are not included in the end-use delivery sectors that EIA reports. ■

Annual U.S. natural gas end-use deliveries by sector (2010–2020)
billion cubic feet per day



Source: U.S. Energy Information Administration, *Natural Gas Monthly*

Note: This graph does not include end-use deliveries of natural gas for vehicle fuel because they represent only a fraction of 1% of total end-use deliveries.

Grid Storage R&D Center planned in Washington State by 2025

The U.S. Department of Energy (DOE) plans a \$75 million R&D center on long-duration, low-cost energy storage. To be built Pacific Northwest National Laboratory (PNNL) in Richland, Washington, the Grid Storage Launchpad will consist of 30 laboratories, assessing battery prototypes and new storage technologies under 'real world' operating conditions.

PNNL is currently looking to select a design and construction contractor and related suppliers. Construction is expected to start towards the end of this year with a view to get the lab operational by 2025.

The Grid Storage Launchpad facility at PNNL will support the DOE's Energy Storage Grand Challenge, announced in January by Energy Secretary Dan Brouillette. The US Government aims for American firms to create sustain a leading role in energy storage utilization and exports, with a secure domestic manufacturing supply chain that does not depend on foreign sources of critical materials.

"The Grid Storage Launchpad facility will bring together researchers and industry from around the country to modernize and add flexibility to the power grid, advance storage technologies, and boost use of clean energy," said Secretary of Energy Jennifer M.

Granholm. "Deploying new grid technologies means we can get more renewable power on the system, support a growing fleet of electric vehicles, make our grid more reliable and resilient, and secure our clean energy future," she added.

Initially, Grid Storage Launchpad will focus on three outcomes to advance grid energy storage development:

- Collaboration: Bringing DOE, multidisciplinary researchers, and industry together at the facility will lower the barriers to innovation and deployment of grid-scale energy storage.

- Validation: The facility will enable independent testing of next generation grid energy storage materials and systems under realistic grid operating conditions.
- Acceleration: From benchtop to systems, the facility will de-risk and speed the development of new technologies by propagating rigorous performance requirements.

Through independent testing and validation of energy storage technology, the lab will develop and promulgate new grid performance standards as well as requirements for the energy storage development cycle — from basic materials synthesis to advanced prototyping.

"It took 40 years to get to the current state of today's lithium-ion battery technology, but we need to move much faster to develop the long-duration, low-cost batteries needed to meet the significant challenges of decarbonizing the energy system," PNNL director Steven Ashby said. "The GSL will speed up the process considerably by doing the work needed to develop and deploy new grid storage technologies." ■



Architectural design of Pacific Northwest National Laboratory (PNNL) in Richland

Wärtsilä to supply two energy storages to help balance Texan grid

Wärtsilä will supply two GridSolv Quantum energy storages, with 200 MW combined capacity, for two projects in southern Texas. The order was placed by Able Grid, part of the North America energy investors MAP RE/ES. The storage systems are due to start operations in January 2022.

Once commissioned, the Madero and Ignacio energy storages will deliver grid support services to the Electric Reliability Council of Texas (ERCOT), the body responsible for managing the electricity supply to more than 25 million customers.

"The Madero and Ignacio projects will participate in the existing ERCOT wholesale electricity market, delivering key ancillary services required for grid stability, including frequency regulation," explained Aaron Zubaty, CEO of MAP RE/ES. Projects are contractually bound to start operations shortly after the start of next year.

Grid support during critical periods

Wärtsilä's GridSolv Quantum is a modular solution, designed for quick and easy deployment and sustainable energy optimization, based on Wärtsilä's GEMS platform

that monitors and controls the flow of energy. These monitoring services will allow the Madero and Ignacio energy storages to swiftly provide grid support during critical periods such as the winter storm that hit Texas in January 2021.

An extreme cold freeze across had gripped Texas and Louisiana in the week starting with January 11, forcing ERCOT to raise energy prices as after the grid reserve was not able to cope with the sudden demand spike. Acute fuel shortages, on some occasions, forced some utilities to implement rolling blackouts.

Eager to avoid a similar situation in winter 2021/21, Able Grid has selected Wärtsilä energy storages for its critical safety and cyber-security features. "The system complies with all applicable standards, like UL9540A, to ensure sustained safe and reliable operations. In addition, the GEMS Power Plant Controller is U.S.-code based



Render of Wärtsilä GridSolv Quantum

and meets all IEC62443 cybersecurity standards," said Sharon Greenberg, Able Grid's Chief Operating Officer (COO).

Under the contract with Wärtsilä, the construction of the energy storages will be managed by Able Grid. The privately-held energy storage power producer, founded in 2016, is currently building multiple utility-scale energy storage projects across the United States. It is owned by MAP RE/ES which directly funded the development of more than 16,000 MW of operating wind and solar generating capacity throughout North America. ■

Virta and Marubeni launch V2G smart charging technology in the UK

Two smart charging technologies – Vehicle to Grid (V2G) and Vehicle to Building (V2B) – have been launched by Virta and Marubeni in the UK. With V2G, the charged electricity from a car battery can be pushed back into the grid, giving National Grid a tool for on-demand power supply to balance rising volumes of intermittent renewable energy.

Technically speaking, one V2G-capable vehicle can offer the grid operator reactive power support, active power on-demand, racking of variable renewable energy sources, load balancing, and current harmonic filtering. Combined, these technologies can put electric cars in the position to provide ancillary services, such as voltage and frequency control and spinning reserve.

While V2G helps the TSO save costs for dispatching emergency power plants, often gas- or diesel-fired peaking units, the V2B technology creates a greater balance with the local environment. Hereby, the e-car is used to consume the energy (often solar power) produced at the building site.

Stored solar or wind power can be used through V2B technology during peak times, reducing costs for the e-car holder while the owner of the smart building can increase self-consumption of the energy produced on-site (demand charge avoidance).

Virta, active in energy management since 2013, has been providing both software and hardware for various projects in the UK.

According to Mr Tolley, the company is targeting “businesses (that are) looking to embrace e-mobility and maximize the potential savings created when energy is at its cheapest.”

PoC to deliver market-ready solution

With the Proof of Concept (PoC) study in the UK, Virta and Marubeni explore the commercialization of V2G and V2B services in Britain, one of Europe’s fastest growing renewable energy markets. The companies announced Vehicle to everything (V2X) is being trialed all over the UK to “look at

opportunities surrounding the mobile battery storage presented by electric vehicles.”

With roll-out of electric vehicles set to rise during 2021 and beyond, this PoC study is meant to deliver a commercialized solution to market on the path towards a low carbon society. The study will explore the commercialisation of V2G and Vehicle to Building (V2B) services to reduce energy costs and emissions. The technology is meant to be ready for commercialisation before 2030.

Apart from Marubeni and Virta, other partners involved in the study are the power and gas retailer Smartest Energy, Marubeni

Auto Investment (UK) and Nissan. Virta will deliver two V2G chargers and an energy management solution to optimize the the V2G element of the project. Nissan’s UK dealership, meanwhile, will focus on delivering factual information on peak shifting and shaving using the on-site solar generation for its electric vehicles. ■



Siemens and Sumitomo commission first HVDC link (2 GW) in India

India’s first high-voltage direct current (HVDC) link has been commissioned by Siemens and Sumitomo Electric to counter the electricity deficit in India’s southern region and improve the grid stability. The 2,000 MW interconnector allows the TSO to optimise energy flows between Pugalur in the southern state Tamil Nadu and Trichur in Kerala on India’s south-western coast.

The commissioning and start-up of the power link helps the Power Grid Corporation of India (PGCIL) to achieve the government’s policies like the ‘24x7 power for all’ initiative. In contrast to conventional the VSC-based HVDC PLUS technology at the Pugalur-Trichur link has black start capability and other functions to improve the performance and security of the transmission system.

Masaki Shirayama, managing director at Sumitomo Electric said he hopes the completion of the “unique hybrid system,” consisting of HVDC-XLPE cable and overhead lines, will “form the basis for continuous collaboration with PGCIL.”

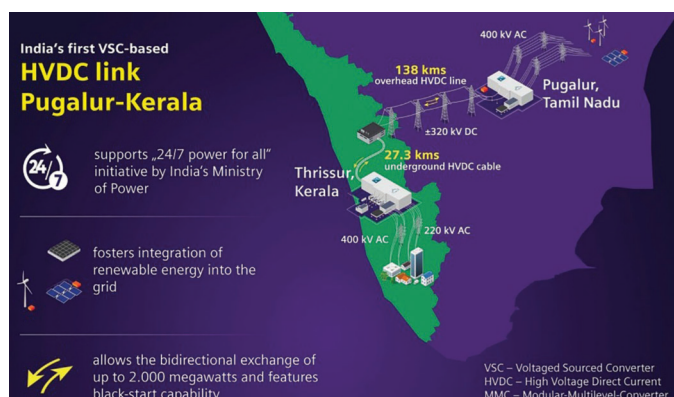
HVDC link commissioned on time despite pandemic

Timely and successful delivery of the first HVDC-XLPE cable project between Pugalur and Kerala was achieved by the efficient collaboration between Sumitomo Electric and Siemens Energy at various levels, despite difficulties caused by the Covid-19 pandemic.

Technically speaking, the power link consists of two converter stations,

connected via DC-XLPE cable and an overhead transmission line. Siemens Energy supplied the two converter stations for the ± 320 kilovolt HVDC system while Sumitomo Electric was responsible for the XLPE HVDC cable system in the DC circuit. The converter stations are linked via a 108km XLPE HVDC cable system comprising four cables a route of 27 km each which was supplied by Sumitomo Electric, and overhead transmission line a route of approximately 155 km installed under another contract.

Shri Narendra Modi, the Prime Minister of India, officially inaugurated the link that is now in full commercial operation with electricity flowing in both directions. In India, where 175 gigawatts of renewable energy-based installed capacity by 2022 is targeted, interconnectors like the HVDC link between Pugalur and Trichur are vital to balance rising volumes of intermittent energy supply and demand. ■





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Five Jenbacher gas engines delivered to CHP in Saarbrücken

A heavy haul truck, carrying an INNIO gas engine weighing 93 metric tons from the Austrian town of Jenbach, has reached Saarbrücken, Germany. Four further J920 FleXtra engines will follow to form the heart of a new combined heat and power plant (CHP), operated by Energy SaarLorLux. All five engines are due to reach Saarbrücken by March 16.

J920 FleXtra engines have a power output of 50 MW and can reach an overall efficiency of up to 92%. Once retrofitted, Energie SaarLorLux's district heating plant Römerbrücke, also known as GAMOR plant will be able to supply around 65,000 households with electricity and 13,000 homes with district heating.

GAMOR was converted to gas as its primary fuel in 2003. The commissioning of the additional gas-fired CHP in early 2022 will result in the complete phase-out of the utility's coal-fired units - lately only dispatched to cover peak loads.

Germany intends to phase out coal entirely by 2038 at the latest; in this coming year alone, coal-fired power plants with a total output of 12.5 GW are projected to go offline. Due to its early phase-out of coal, the project in Saarbrücken is exemplary for that policy.

The generation of power and district heating from coal will soon be a thing of the past in Saarbrücken. "In the future we'll

save more than 60,000 metric tons of CO₂ a year compared to the old coal-fired facility," said Joachim Morsch, board member and spokesman from Energie SaarLorLux, explaining the environmental benefits of the INNIO Jenbacher CHP plant.

Ideal complement to renewables

Given that Jenbacher gas engines offer highly flexible deployment and can be ramped up to full load in less than five minutes, they are responsible for playing an important part in stabilizing the grid. Additionally, Jenbacher gas engines can help facilitate grid stabilization in the event of an impending blackout, thereby ensuring Saarbrücken residents benefit from a secure electricity supply – a task which 4,000 INNIO Jenbacher gas engines have already under-

taken when Europe experienced its latest near-blackout at the beginning of this year.

The fast start capability of INNIO gas engines also makes them an excellent solution to complement renewable energies, since energy generated from renewable sources can fluctuate greatly due to the variability of weather conditions. Therefore, in addition to energy storage power systems, power plants capable of rapid start-up are required to balance out these fluctuations. ■



The J920 engines on arrival at Energy SaarLorLux's CHP site

JERA files for environmental permit for Chita LNG-to-Power plant

Japan's largest LNG importer and power producer JERA has submitted the environmental impact assessment and scoping document for Units 7&8 at its Chita Thermal Power Station. The plan involves the decommissioning of the ageing coal-fired Units 1 through 5, and replacing them with two LNG-fuelled combined-cycle power units with 63.2% thermal efficiency.

The repowered 854 MW combined-cycle Unit 6 will be retained, and may be decommissioned in 2026. It will be complemented by the two new-build combined cycle units, each 650 MW, bringing the total capacity of the repowered complex to 2,154 MW.

Today, the detailed environmental impact assessment is being made available for public review, and the Japanese energy regulator will hold a public meeting to discuss the plan on March 26.

In the regulatory filing, JERA specifies the new units 7 & 8 will be equipped with the latest high-efficiency combined cycle power generation system to boost efficiency and reduce emissions. Moreover, the two units have already been assessed to cause less smoke and warm wastewater than Chita power station's currently operational units.

Conversion after conversion

Operational since 1966, the Chita power complex has undergone a series of conversion and upgrades over the past decades. The complex had first been operated by Chubu Electric but was transferred to JERA, following Chubu's joint venture with Tepco.

Units 1 through 4 were modernized and converted to burn natural gas in 1985, whereas Units 5 and 6 were designed as LNG-fired plants from the start. In the early 1990s, Units 1, 2, 5 and 6 were converted into combined cycle plants by adding a gas turbine to the existing boiler-steam turbine units to reuse exhaust gases. These upgrades had given the Chita Thermal Power Station a total power generating capacity of 3,966 MW, entirely fuelled by LNG.

The first four units have been taken offline from October 2017 but have not yet been demolished. JERA now disclosed it plans to fully decommission the units over the course of 2021. ■



View of Chita Thermal Power Station

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