Gas to Power Journal
Peakload Power and Energy Storage

Focus on Gas Supply Risks and Alternative Fuels

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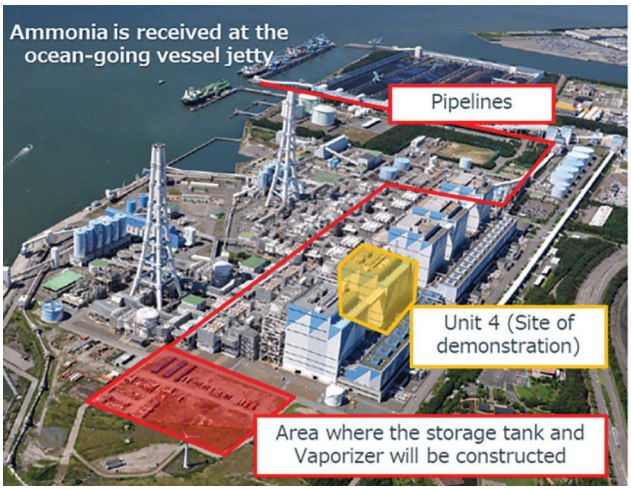
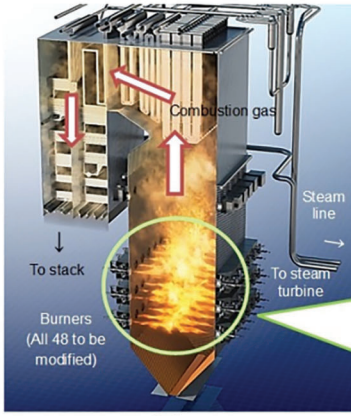
JERA launches tender to procure ammonia fuel for power gen

Japan's largest power producer JERA is conducting a competitive bid to procure up to 500,000 tons of ammonia per year under a long-term contract running from 2027 until the early 2040s. JERA is working to switch 20% of the fuel at Unit 4 of its Hekinan Thermal Power Station to ammonia by the late 2020s.





Boiler

Given the steady progress at the Hekinan demo project and the potential to convert other fossil power stations to ammonia co-firing, JERA has decided to procure the green fuel at large and supply it to various Japanese power producers.

A request for proposals (RFP) has been sent to more than 30 potential suppliers. After evaluating the proposals received, JERA will select several companies by around May and discuss specifics with them. The fuel is meant to be delivered 'free on board' (FOB), but no details were disclosed with regards to pricing.

Striving to reach Net Zero emissions for its domestic and overseas businesses by 2050, JERA is working to set up a supply chain for green fuels such as ammonia by expanding commercial flow in cooperation with Japanese domestic utilities.

Research for higher co-firing rate

Together with Mitsubishi Heavy Industries (MHI), researchers at JERA have received Japanese government funding to develop a

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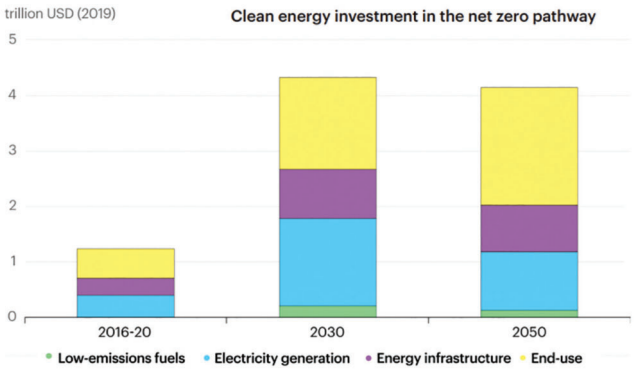
Energy Capex could top $5 trillion by 2030 in pivot to clean fuels

Unparalleled clean energy investment – set to triple by 2030 – will drive up overall capital expenditure on energy projects to $5 trillion by 2030 and add an extra 0.4% per year to global GDP growth. In its Net Zero pathway, the International Energy Agency's (IEA) assumes no new oil and gas fields or coal mines will be developed as demand shifts to clean fuels.



Beyond projects committed as of 2021, no new hydrocarbon fields or coal mines will be developed if the world wants to reach Net Zero by 2050. Unabated coal demand, in this scenario, plunges 98% to less than 1% of total energy use in 2050 while gas demand declines 55% to 1,750 billion cubic meters (bcm) as the transport and power gen sector shifts to green fuels.

Clean electricity generation, network infrastructure and end-use sectors, meanwhile, will be the areas where investment will be stepped up. To accommodate for more decentralized power generation and renewables build-out, annual spending on electricity grids would need to expand from $260 billion today to $820 billion in 2030.

To clean up transport, number of public charging

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AGENDA

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novel technology that will increase the rate of ammonia co-firing at boilers in thermal power stations. Burning ammonia is carbon-free and the JERA-MHI team vowed to verify co-firing with at least 50% ammonia at two different boiler types by 2028.

A grant for JERA-MHI's project to develop an ammonia single-fuel burner has been accepted under Japan's Green Innovation Fund program of the New Energy and Industrial Technology Development Organization (NEDO). Funding for the project has been made available for an 8-year period from financial year 2021 to financial year 2028.

Within the first four years of the project, JERA and MHI have committed to develop a new burner capable of single-fuel ammonia combustion and draw up a master plan for equipment to demonstrate its use in actual boilers.

Based on the results, the two companies will decide whether to install the burners at JERA's coal-fired boilers made by MHI. For the actual plant demonstrations, the two partners are now working on verifying a novel technology to co-fire at least 50% ammonia at two power plant units with different boiler types. The test runs are due completed in early 2028. ■

KEPCO commercializes technology for H2 and NH3 co-firing

Korean Electric Power Corp. (KEPCO) is about to commercialize carbon-free power generation technology based on hydrogen (H2) and ammonia (NH3) fuel blends. It took the Korean utility 36 months to evaluate the limits of a gas turbine fired by hydrogen blends, and just 30 months to develop an ammonia-based generation technology.

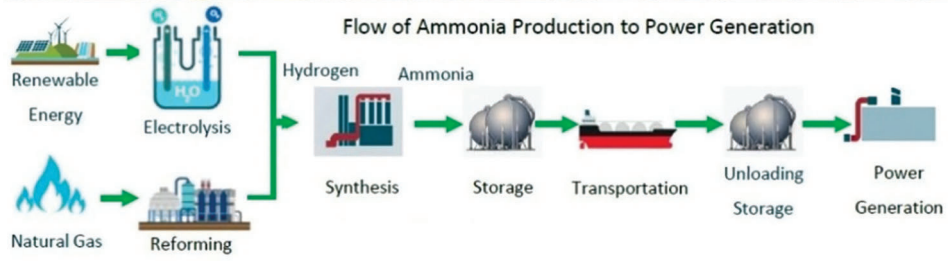
Working with five electric utilities and eight manufacturers, KEPCO has been undertaking joint R&D to develop, test and verify power generating technology based on NH3-blends. These eight partners are Doosan Heavy Industries & Construction, Hyundai Heavy Industries Power System, the Research Institute of Science and Technology (RIST) in Pohang, Lotte Fine Chemical, SK Gas, TENEX Korea, GS Donghae Electric Power and Samcheok Blue Power.

Technical demo by 2027

Eager to take the lead on ammonia co-firing, KEPCO is fast-tracking works to complete a technical demonstration at four commercial-sized power plants. By optimising combustion technology, ammonia-blends will be tested and proven on both coal-fired and LNG-fuelled power units.

Hyundai and Doosan strive to optimize the boiler design to allow for the co-firing of clean fuels with a view of building a demonstration power plant and applying the technology to larger units. Four commercial power stations are meant to be retrofitted for NH3 co-firing by 2027.

To source clean fuel, KEPCO is looking to set up an ammonia supply chain by July 2024, along with related safety regulations. By 2030, ammonia co-firing technology is meant to be commercialized at 24 power plants in South Korea which is expected to reduce greenhouse gas emissions by 20 million tons per year. ■



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points for electric vehicles (EVs) needs to rise from around 1 million today to 40 million in 2030, requiring annual investment of almost $90 billion in 2030. Annual battery production for EVs leaps from 160 gigawatt-hours (GWh) today to 6,600 GWh in 2030 – the equivalent of adding almost 20 giga-factories each year for the next ten years.

And the required roll-out of hydrogen and carbon capture utilisation and storage (CCUS) after 2030 means laying the groundwork now: annual investment in CO2 pipelines and hydrogen-enabling infrastructure increases from $1 billion today to around $40 billion in 2030.

To achieve the IEA's Net Zero ambitions, many developing countries, which currently rely on public funding for clean energy projects, will need to reform their policy and regulatory frameworks to attract more private finance. But analysts underline government investment and public policies are essential to attract large amounts of private capital and to help offset the declines in fossil fuel income that many countries will experience. ■

Gas to Power Journal

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Russia warns EU gas prices could soar on suspension of Nord Stream 2

Russia's former President Dmitry Medvedev warned of a spike in Europe's gas prices after the German Chancellor Olaf Scholz has suspended the $11 billion Nord Stream 2 pipeline project over the escalating Ukraine crisis. "Welcome to the new world where Europeans will soon have to pay €2,000 per thousand cubic metres!" he tweeted.

Certification for the 55 billion cubic meters per year Nord Stream 2 project after the Russian President Vladimir Putin formally recognised two breakaway regions in eastern Ukraine. As a consequence, Scholz ordered the economy ministry to withdraw a report on German supply security, thus halting the certification process at the Federal Network Agency (BNetzA).

Prices jumped on the news. The March front-month at the Dutch TTF, Europe's benchmark gas trading hub, was up 9.8% at €78.96 per Megawatt-hour (MWh) – having soared to similar levels like in the fourth quarter, when Nord Stream 2 had been scheduled to start which never happened.

Putin was quick to assure that Russia would not interrupt any of its existing gas supply, given that the Kremlin hopes the delay of Nord Stream 2 would be "temporary." State-dominated Gazprom, however, had disclosed earlier that supplies to its European customers were lowered by over 35.5%, or 9.8 bcm, in January and February.

LNG could balance remaining flows through Ukraine

In the midst of the energy transition, Germany and the EU still rely heavily on imports of fossil fuels, as domestic resources have begun to deplete or their extraction is becoming too costly. Gas covered more than a quarter of Germany's primary energy use in 2021, and about half of that volume comes from Russian imports.

However, Russian gas deliveries to Europe has already fallen – and replaced by LNG – to such a degree that halting the remaining flows through Ukraine would have "a limited additional impact." According to IHS Markit figures, LNG shipments to Europe surged in January and early February, covering 34% of total supply while Russian pipeline gas fell to just 17%.

Transits of Russian gas through Ukraine fell to historical lows in January — 50 million cubic meters per day (Mmcm/d), less than half of levels from a year ago. While flows swung back up with the beginning of February, they are still at half the levels of the 2015-2020 period. ■

Landfall of the Baltic Sea interconnector in Ust-Luga, Russia

Hanseatic Energy Hub advances plans for Germany's first LNG terminal

Germany could soon have its first LNG import terminal as Hanseatic Energy Hub, developer of an 8.8 mtpa liquefaction plant in Stade on the Elbe River, will seek planning permission for the €800 million project this summer. "In the most favourable case, the approval process could take one to one-and-a-half years and then building starts," said Hanseatic Energy managing partner Johann Killinger.

For long, Germany has been the only major economy in Western Europe without its own LNG import terminal, though three projects had been under discussion in Stade, Brunsbüttel and Wilhelmshaven. The suspension of the Nord Stream 2 pipeline over Russia's aggression in Ukraine takes away the option to import 55 Bcm/year from Gazprom – these volumes may well now be sourced through LNG imports.

"Natural gas as a fossil energy source is still needed. The early phase-out of coal and the phase-out of nuclear power (in Germany) should be completed by the end of the year. But it doesn't work without gas. The share will even have to increase before you can say goodbye to gas," Killinger was cited by the Hamburg-based newspaper 'Die Zeit'.

Stade LNG would be built adjacent to a plant owned by US multinational Dow Chemical and is aimed to start operations in 2025, though project sponsors have not yet taken a final investment decision. An open season for the proposed 8.8 mtpa venture, held in February 2021, confirmed market interest which prompted the Belgian gas transmission system operator Fluxys to join as an industrial partner.

Rival projects on hold

The two rival projects are still clouded in uncertainty. German LNG Terminal, a joint venture of Gasunie, Vopak and Oiltanking, already applied for planning permission for the 3 mtpa Brunsbüttel LNG import project after having been granted exemption from network access by the European Commission. "The project is moving ahead," developers claim without specifying a timeframe.

Even four years after presenting plans for Brunsbüttel LNG, project partners have not moved to taking a final investment decision (FID) yet. The venture would cost around €450 million.

Demand uncertainty looms large, as Germany transitions away from fossil fuels hence the developers of Brunsbüttel LNG were quick to point out that the planned terminal – with two LNG tanks of 165,000 cubic metres each – could be adapted to also import hydrogen at a later stage.

Render of Stade LNG

Uniper, the project sponsor of the rival Wilhelmshaven LNG project has abandoned plans to import super-chilled gas after a tender in 2020 showed too little interest in binding bookings of long-term LNG regasification capacities in Germany. Fortum, Uniper's Finish parent company, is now pursuing a strategy of turning the Wilhelmshaven project into an import terminal for hydrogen, green ammonia and a 410 MW onsite electrolyser for the production of green hydrogen. ■

Growth in crypto mining could disrupt energy markets; Fitch warns

Unregulated crypto mining has grown rapidly which risks to disrupt the energy sector in emerging markets, Fitch Ratings warns. Electricity makes up 90% of crypto mining costs, hence Bitcoins are often produced in countries with low cost, state-subsided energy. With 125 TWh electricity demand per year, crypto miners curtail energy supply for local industry.

Bitcoin's share in crypto assets is about 40%, but its annualised power demand is already comparable with the electricity consumption of countries such as Norway and Sweden, according to the Cambridge Centre for Alternative Finance.

Risk of grid overloads

Though crypto mining has advanced from its initial desktop set-up and now requires specialised equipment worth thousands of dollars per farm, such operations are still fairly quick to establish or relocate.

China used to be home to two-thirds of global Bitcoin mining, but when it was banned in 2021 the industry swiftly moved to Russia, Kazakhstan, Canada and the US. In some locations, new farms have reportedly caused power grid overloads or blackouts.

Demand uncertainty

Unchecked growth of crypto-currencies' electricity demand not only challenges grid operators, but also power producers. The lack of transparency of miners' future demand, as well as whether they might re-locate to a country with cheaper electricity prices, makes it difficult of utilities to plan the dispatch of their power generation assets – let alone invest in new ones.

Regulators are increasing their focus on cryptocurrencies, first and foremost due to their potential impact on financial markets' stability and their use in illicit activities, but also due to the impact on energy markets. Following China's ban on cryptocurrencies' mining, Russia is discussing similar proposals. Many other countries plan to implement expansive regulatory frameworks to manage digital assets, including standards, supervision and disclosure requirements.

Ban on energy-intensive mining

The European Securities and Markets Authority wants to ban the most energy-intensive method of mining – "proof-of-work", used in Bitcoin – and pivot towards less energy-intensive "proof-of-stake" mining and validating of blockchain transactions. The Ethereum platform for Ether, the second-largest digital asset, is migrating to it.

Regulators could also request that mining datacenters need to be located close to abundant renewable energy sources, and demand response contracts with TSO could requiring miners to lower their electricity use during peak hours. Fitch Rating advises miners should proactively link their electricity consumption to periods of low demand. ■

RWE, Uniper and Rockhopper launch €4 billion lawsuit over coal exit

Five European energy companies – lead by RWE, Uniper and UK's Rockhopper – have filed a €4 billion lawsuit against Italy, Poland, Slovenia and the Netherlands under the Energy Charter Treaty. The claimants oppose government decisions that mandate the closure of coal-fired power plants without compensation, or block the development of upstream oil projects.

Roger Miesen, head of RWE Generation said the company does not question the coal phase-out decided by parliament, but "we do not consider it right that the law does not provide for compensation for the resulting disruption to the company's property." RWE has invested more than €3 billion in its 1,560 MW Eemshaven power plant, due to the coal phase-out act and the fact that biomass as a substitute fuel is not economically viable without subsidies from 2030 onwards.

Coal-fired Eemshaven power plant (1.5GW)

Uniper has a similar view and wants to "obtain legal clarity" about whether it really needs to close its coal-fired power stations in the Netherlands without adequate compensation.

Rockhopper did not want to comment while legal proceedings are ongoing. The UK-based claimant field a case after the Italian government refused to issue a permit for the development of the Ombrina Mare oilfield in the Adriatic Sea.

Austria-based Petrochemical Holding brought a case against Romania over an oil development contract, and the company's legal counsel said the Romanian government's "stated desire to move away from fossil fuels … may lead to further claims."

Risk of investor-state arbitration

The Energy Charter Treaty, carved out after the cold war and signed by more than 50 countries, was designed to protect international energy investments including fossil fuel-based projects. Critics say this protection hampers national government from adopting policies to scale down power generation methods or industrial processes responsible for global warming over the risk of legal action.

The €4 billion legal action "may have a chilling effect, undoubtedly, on all kinds of policy change," Dmitri Evseev, partner at the law firm Arnold & Porter told the Financial Times. "Investor-state arbitration is the biggest stick that investors have."

Negotiations to modernise the Energy Charter Treaty are underway, but a proposal to end protection for fossil fuel investment is only being supported by three signatory countries. Many others, notably Poland, remain heavily reliant on fossil fuels. ■

Siemens Energy increases pressure on Spanish wind power arm

Siemens Energy has put more pressure on its Spanish wind power unit Gamesa. "We want management to push for change with discipline and in all consequence," CEO Christian Bruch said prior to the annual shareholder's meeting on February 24. The German manufacturer is expected to buy the rest of the ailing unit and restructure it.

Investor want CEO Bruch to take urgent action given that revenue of the Spanish wind power arm plunged by 20% in the first quarter. Siemens Gamesa's outgoing Andreas Nauen CEO had blamed a "perfect storm" of supply chain issues, rising costs for raw materials and internal problems. Even five years after the merger, the corporate cultures of the Spanish arm and its German main shareholder have not found a common ground.

Jochen Eickholt is set to replace Nauen, effective March 1 – and expectations are high. Even prior to taking over the reign, Eickholt has visited wind power factories in Denmark, Portugal and Spain, promising to "set course for profitable growth." Investors are losing patience which is reflected in share price.

Deal expected by May

To get a full grip on its ailing wind power business, Siemens Energy is looking to buy the remaining 33% stake in Gamesa it does not yet own. A deal could be agreed before the company's capital markets day in May, people close to the company commented.

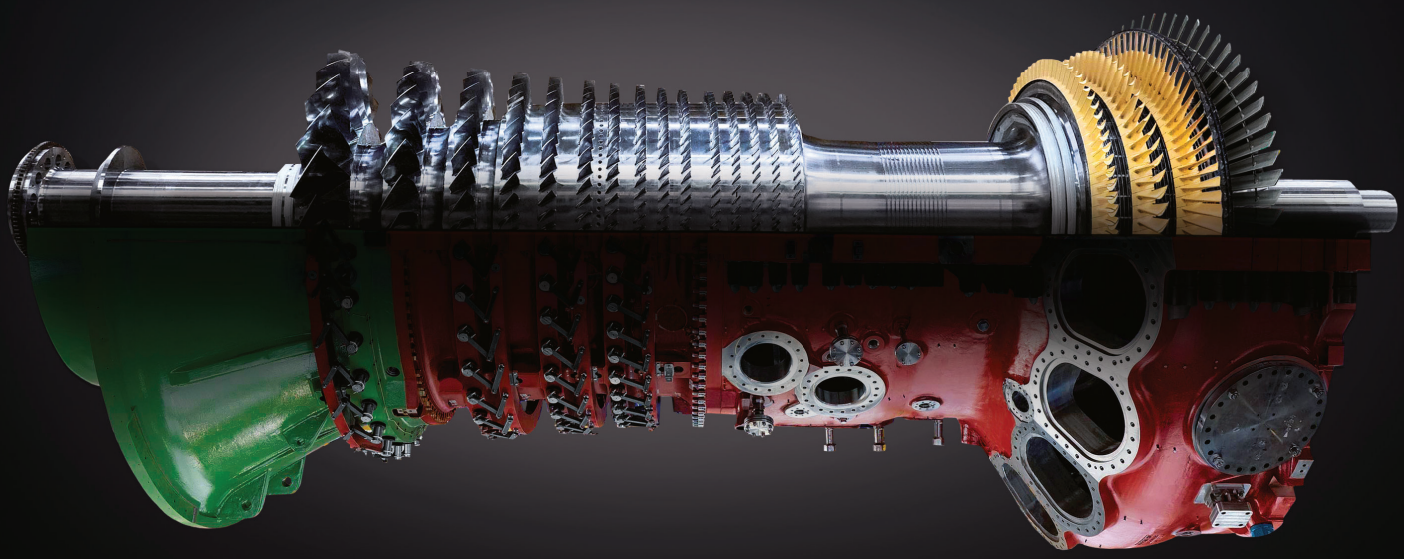
Conjuring up enough cash to buy the remaining 33% stake would be a 'tour de force', analysts commented and hence expect a takeover through an exchange of share to indirectly finance the full takeover.

CEO Bruch need to avert further risks after the company had to lower its outlook three times over the past nine months to mirror downgrades of Spanish-listed Siemens Gamesa. "Fix it, sell it or close it" are the options – many investors prefer an outright sale while others hope a through restructuring will do.

Cut cuts already helped Siemens Energy, spun off from Siemens AG in 2021, to return to a net profit of €99 million ($119.53 million) in the first quarter of its financial years – a decisive turnaround after a loss of €195 million a year ago. And more cuts are yet to come as CEO Bruch plants to reduce Siemens Energy's plans to axe about 7,800 jobs in the company's gas and power segment in reaction to a slowdown of the company's core fossil business. ■

ITALIAN ENERGY

BRIGHTER FUTURE



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Mitsubishi to fire up JAC-class gas turbines at Fujairah F3 plant in 2023

Mitsubishi Power is working to install, test and commission three M701 JAC-class gas turbines at the Fujairah F3 combined-cycle power plant by early 2023. The 2.4 GW unit under development at Ras Al Qidfa will be the United Arab Emirate's largest power station, capable to supply 380,000 households with electricity.

Fujairah F3 is being built by a consortium of Abu Dhabi Power (ADPower, 60%) and Japan's Marubeni (40%). The two companies were awarded a contract by Emirates Water and Electricity Company (EWEC) to finance, build and operate the 2.4 GW facility at a site between the existing F1 and F2 power units.

EPC works are carried out by Samsung Construction & Trading (C&T) under a contract worth US$977 million. The three M701 turbines were shipped by Mitsubishi Power to the Fujairah, UAE, in December from its Takasago Machinery Works in Japan.

M701 JAC-class gas turbines achieve an efficiency greater than 64%, reliability of 99.6%, and the lowest carbon emissions per unit of power when used in combined cycle. Capable of operating on a mixture of up to 30% hydrogen and 70% natural gas, the turbines can be increased to 100 percent hydrogen in the future.

For Mitsubishi, the F3 project is the first in the Middle East to utilize advanced JAC-Series gas turbines. To fast-track works, the Japanese OEM dispatching engineers to provide support until the start of commercial operations, and will handle maintenance and repair of the generating units. ■

Fujairah F3 is being built between the F1 and F2 units

INNIO and Concord Group build four biogas power plants in Malaysia

Austrian engine maker INNIO and Concord Group have agreed to develop four power plants across Malaysia, fuelled by palm oil wastes. The four plants, each driven by two INNIO Jenbacher biogas engines, will deliver more than 8 MW sustainable power to the grid while capturing methane.

The biogas-to-power projects help Malaysia to use waste for generating electricity and moving away from fossil fuels. Built in various parts of Malaysia, the power plant will make use of locally available palm oil waste to produce biogas – a sustainable fuel for power generation.

Methane gas emitted by existing palm oil mills will be re-appropriated to produce electricity, a further step to help the notoriously pollutive palm oil industry in Asia to lower its emission footprint.

Jenbacher Type 4 engines are known for their dependability, efficiency and fuel and solution flexibility. According to INNIO, this makes them an excellent fit to help Malaysia reduce its reliance on fossil fuels. At the COP26 Climate Summit in Glasgow, the government of Malaysia raised its National Renewable Energy Capacity target from a 20% increase to a 31% increase of renewables in the national energy mix by 2025.

"We have more than 500 Jenbacher engines currently operating on biogas and deploying about 1 GW in the ASEAN region," said Carsten Dommermuth, general manager Asia Pacific at INNIO Jenbacher. "Our Jenbacher Type 4 biogas engine fleet delivers reliable and fuel-efficient heat and power, where the additional surplus energy is fed into the power grid as a renewable, dispatchable power source."

"Having successfully worked with INNIO in the past, we can think of no better technology to support our clean energy goals," said Concord Renewable Energy CEO, Datuk Khairuddin bin Tan Sri Mohd Hussin. He is confident the Jenbacher biogas engines will help meet growing energy demand while reducing emissions. ■

Palm oil production in Malaysia

NEWS NUDGES

GenCell provides backup power for Dt Telekom

Israel-based GenCell has completed a lab test of its hydrogen-based backup power solution with Deutsche Telekom. Lab tests, carried out in Tel Aviv, validate GenCellBOX as a zero-emissions source of electricity. The two partners will now integrate GenCell units into a mobile telecommunication site for testing under live conditions. Deutsche Telekom has some 242 million mobile customers, hence ensuring reliable power is vital for the company's network of mobile sites.

Enel buys 480 MW plant from ERG

Italy's state-dominated utility Enel has bought a combined-cycle gas turbine unit from ERG, a renewable energy operator. The plant, situated in the Sicilian province of Syracuse, has an installed capacity of 480 MW.

Wärtsilä to service two CHPs in Italy

Finish technology group Wärtsilä has signed a 10-year service agreement for two industrial combined heat and power (CHP) plants in Italy. The plants operate with 31SG gas engines, and supply electricity, steam, and hot water for industrial use. To date, Wärtsilä has delivered 1,411 MW of power plant capacity to Italy, of which 709 MW are currently covered by long-term service accords.

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