



China needs to modernise power grids to absorb 100 GW solar growth

Industry experts have urged the Chinese government to modernise the power grid to be able to absorb between 95 and 120 gigawatt (GW) of new solar power installations this year, a record rise in annual capacity additions. Flexible gas-fired power plants and energy storage are also needed to balance rising volumes of fluctuating power supply.

China has staged the world's largest solar additions in recent years, with around 30% of installed solar capacity globally, but grid operators are now reaching a limit and struggle to accommodate more intermittent supply. There is a risk that only a small share of the newly added solar capacity can be utilized to its full potential – unless it gets backed up by dispatchable capacity.

The State Power Investment Corporation (SPIC) recommended a 'solar PV plus' business model whereby electricity generated from newly added solar installations will be directly sold to nearby



Solar panels in China's Fujian province

industries, without having to be fed into the regional power transmission grid. This model requires, however, a coordinated supply-demand analysis carried out by project developers together with

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Cheaper LNG set to drive coal-to-gas switching in the power sector

Global gas prices have fallen substantially to below \$14/MMBtu in early 2023, down from record averages of \$40/MMBtu last year, prompting coal-to-gas switching in the European power generation and industrial sectors. But for key markets in Asia to react, Wood Mackenzie reckons gas prices would need to fall below \$12/MMBtu before any meaningful oil-to-gas switching occurs.

The trigger for coal-to-gas switching in Europe was pulled when prices dipped below \$19/MMBtu, finds WoodMac's latest report 'Gas demand response to lower prices.' With storages across the EU well filled after a warmer-than-normal winter, gas markets are expected to seek a new balance this year.

If gas prices decline further, utilities could be incentivised to recover some more gas demand against competing fuels, said Lucas Schmitt, gas and LNG analyst at Wood Mackenzie. However, the trigger point for



any oil-to-gas switching in Asia is forecast to be below \$12/MMBtu – substantially lower than that for coal-to-gas switching in Europe.

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electricity consumers. High prices for imported gas and thermal coal has increased the drive to invest in utility-scale solar with distributed solar PV already accounting for 58.5% of the overall 87.41 GW of solar capacity additions in 2022.

Solar becomes "new king" on power markets

'Dirty king coal' is increasingly losing out on cost not only to natural gas but also increasingly to solar power. Based on solar

PV's "extremely competitive costs," the International Energy Agency (IEA) expects solar-derived power will become the "new king" of world electricity markets, overtaking gas.

India, Asia's second largest economy, is also seeing explosive growth in solar power with EIA analysts anticipating it will match coal's share within two decades. Today, solar PV makes up 3% and coal close to 70% of India's power mix, but by 2040 they will converge in the low 30%.

But the pace of the green energy transition is determined by the level of grid resilience. Going forward, new power lines, demand-side response and energy storage will play a much greater role. „Battery storage is particularly well suited to the short-run flexibility that India needs to align its solar-led generation peak in the middle of the day with the country's early evening peak in demand," analysts commented. Similar measures should also work well in China. ■

Reliance and BP re-launch auction for gas sale from KG-D6 block

India's Reliance Industries and its partner BP Exploration will re-launch an auction for the sale of 6 million cubic meters per day of natural gas from their offshore KG-D6 block, having incorporated the government's new rules to prioritise city gas companies. An e-auction is scheduled for April 3 and the price will be indexed to the JKM LNG price.

But despite its indexation to JKM, the Northeast Asian reference spot price for LNG, the price of the gas sold at auction will be capped by a government-imposed price ceiling:

Bidders are understood to have been asked to quote a variable 'V' in the gas price formula 'JKM + V', with the starting bid for 'V' initially set at \$-0.30/MMBtu but later changed to \$-0.42/MMBtu. The tender invites participants to submit bid that are higher or equal to the starting quote – though the maximum bid for 'V' has been set at \$2.01/MMBtu.

New rules require bidders to specify upfront whether they purchase the gas for their own use or for re-sell as a trader. While end-users are permitted to re-market unconsumed gas, traders are mandated to only re-sell at a maximum trading margin of Rs200 (\$2.42) per thousand cubic meters.

The Indian ministry of petroleum and natural gas also requests that gas volumes sold at auction need to be first offered to bidders belonging to the transport sector, followed by the fertilizer, LPG and power generator sector.

Reliance and BP underlined they have incorporated all required changes in their tender and increased the duration of supply contracts to five instead of three years, as offered in the January auction. Gas supplies to successful bidders will start from April 16. ■



Reliance's KG-D6 block

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Increased trucked LNG drives demand

Lower gas prices look certain to drive demand in China, the report finds, suggesting Asia's largest economy has some room for trucked LNG volumes to recover without initially relying too heavily on the spot market.

"If spot LNG prices start competing with the highest levels of contracted LNG – estimated around \$14-15/MMBtu – we could see some appetite emerging again. But the scale of Chinese economic growth in 2023 as it emerges from the Covid pandemic will be the biggest driver to support LNG demand" Schmitt explained.

European ammonia production could return

The low gas prices being witnessed in early 2023 are starting to make European ammonia production look competitive again.

The cost of Europe-produced ammonia far exceeded the market price and production subsequently fell to about 50% of installed capacity in 2022, according to Wood Mac findings. Tough falling gas prices help ammonia producers, the margins are still tight for producers and Schmitt warned "some factories may be forced to close their doors for good in the coming years." ■

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ifo Institute urges EU to refrain from subsidies in response to US IRA

The German Institute for Economic Research (ifo) has urged the European Union to refrain from further debt-financed subsidies in response to the US Inflation Reduction Act (IRA). "The EU should avoid entering into a subsidy race to locate battery or solar cell factories that work with known technologies – that is self-defeating," said ifo president Clemens Fuest.

Instead, the EU should focus on "competitively awarded funding for research, development and innovation as well as the development of infrastructures." It would be advisable, however, for the EU to oppose protectionist elements of the IRA in negotiations with US policy makers, researcher Niklas Potrafke noted.

The IRA directs nearly \$400 billion in US federal funding to clean energy. These funds will be delivered through a mix of tax incentives, grants, and loan guarantees. Meanwhile, NextGenerationEU programs for climate protection have already been set up and they still have funds available, ifo Institute said without specifying.

As a next step, Europe should make up for its own shortcomings in industrial policy, researchers suggest: "Inexpensive and reliable energy supply requires greater integration of the European energy markets, expansion of energy networks, renewable energy sources and nuclear power, and the promotion of research in these areas," Potrafke said. In addition, there needs to be a

new platform economy in the energy sector, in which private households and companies simultaneously act as consumers and producers of energy.

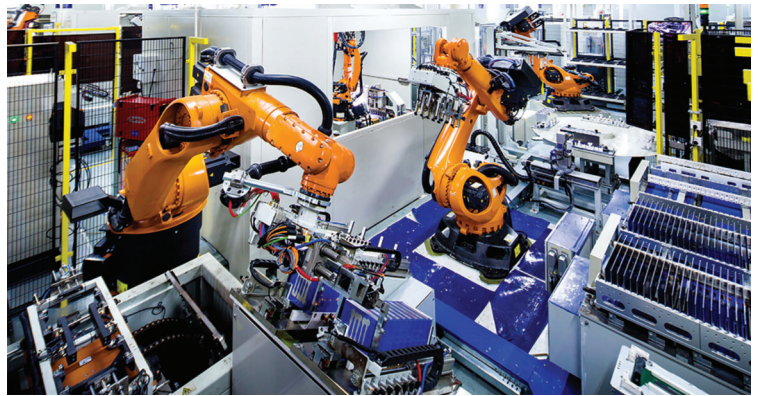
EU Net-Zero Industry Act and others

The European Commission recently unveiled the Net-Zero Industry Act, stipulating that at least 40% of technologies like solar photovoltaic, wind power and carbon capture and storage have to be manufactured within the bloc by 2030.

There are also plans for a European Hydrogen Bank as the EU is concerned that industries for future technologies could move to other parts of the world to the detriment of

EU firms. The latest landmark US climate legislation provides significant support for green tech companies producing in the United States.

Tax credits under the IRA have dramatically improved unit economics for clean hydrogen with breakeven across various use cases achievable in three to five years, McKinsey finds, anticipating American production of the clean fuel to rise six-fold to six million tons by 2025.



View into a battery cell factory

EU should stay competitive in clean energy tech manufacturing

International Energy Agency (IEA) head Fatih Birol has called on Europe to deliver a new industrial masterplan to remain competitive in the age of clean energy technology manufacturing. Despite praising EU member states for significantly lowering their reliance on Russian energy in just 12 months, he said much work lies ahead to fine-tune Europe's Green Deal Industrial Plan.

Many countries and regions worldwide used the energy crisis as a wake-up call to invest in clean energy technologies, building up domestic industries and nurtur-

ing supply chains closer to home. The US Inflation Reduction Act, Japan's Green Transformation programme and India's Production Linked Incentive scheme are a few of the early movers.

the plan [given that] their design and implementation will shape the future of Europe's industry."

Speaking with the Commission President Ursula von der Leyen, the IEA head singled out the effectiveness of government policy to wean Europe of fossil fuels when Russia's gas flows to Europe have plummeted by 80% since just before the invasion of Ukraine. The amount of solar and wind capacity added in the EU increased by over 40% in 2022, as did heat pump installations and investments in energy efficiency.

But Birol warned that cocktail of factors could still throw Europe off course: There is risk of a full shutdown of pipeline gas flows by Russia and a fast rebound in Chinese gas imports after its lifting of Covid restriction.



Solar panel factory

Birol called Europe's Green Deal Industrial Plan "ambitious and far-reaching" as it proposes mechanisms to tackle the industrial transition and covers a wide range of sectors and technologies. But he underlined that "much work remains to develop the policies and measures outlined in

Gas power additions in Europe dwarfed by dispatchable plant closures

Nearly 10 GW of combined- and open-cycle gas generation is under construction across Europe but that number is dwarfed by 15 GW closures of dispatchable capacity announced for this year, according to S&P Global Commodity Insights. Growth of unabated gas capacity mostly comes from projects supported by capacity payments and where FID was taken before the energy crisis.

In Italy, Edison is working to start up combined-cycle power plants at Presenzano (810 MW) and Marghera (817 MW) in April and June, while EP Produzioni Tavazzano gas power plant (850 MW) is aiming for a March 2024 completion. Construction on Enel's Fusina combined-cycle plant (840 MW) started in late 2022.

All these projects are supported by capacity mechanisms, as are the Mytilineo's Agios Nikolaos CCGT (826 MW) in Greece which is about to start operation. Works are underway to build the Alexandroupolis combined-cycle plant (840 MW) developed by

PPC, DEPA and Copelouzos Group.

In Poland, large gas-fired power projects in construction include Dolna Odra (2 x 700 MW), Ostrołęka (745 MW), Grudziądz (563 MW) – also underpinned by capacity payments according to S&P Global data.

In Germany, however, there is no capacity payments scheme so gas capacity additions mostly focus on grid-stabilising open-cycle plants, like the four 300 MW OCGTs in southern Germany which are nearing completion. Steag managed to get its Herne 6 combined-cycle plant (600 MW) into operation last autumn, while the chem-

ical company Evonik and the carmaker Volkswagen completed coal-to-gas switching projects at their Marl and Wolfsburg factories.

Huge decline in capacity

But analysts warned there is only limited incremental growth in unabated gas capacity to 2025, with most investment decisions predating the energy crisis. According to S&P Global forecast, a 5-GW net gain in gas-fired power plant capacity over the next three years will be followed by a 20 GW decline in the subsequent three years – and by 2050 there is just 15 GW left on the system, with negligible output.

Closures of thermal capacity is substantial in the years ahead: In its latest European Electricity Long-Term Forecast, S&P Global sees West European gas, coal, and lignite capacity falling to 199 GW in 2025 and 133 GW in 2030, down from 215 GW in 2020. Nuclear capacity, meanwhile, is seen declining from 95 GW in 2020 to 76 GW by the end of the decade.

At the same time, wind and solar power capacities across western Europe are expected to 487 GW in 2025 and 818 GW in 2030, up from 292 GW in 2020 as the continent seeks to accelerate the green energy transition in the face of very low Russian gas deliveries and comparatively high LNG prices. ■



Construction works for Mytilineo's Ag. Nikolaou CCGT

Germany faces 30 GW electric capacity gap by 2030; McKinsey warns

Unless new gas-fired power plants are built, Germany faces an electricity capacity gap of 4 GW which will rise to 30 GW by 2030 due to the phase-out of nuclear and coal, McKinsey warns. This gap cannot be bridged by renewables alone, hence analysts advise demand-side measures, adding new gas-fired capacity and letting coal plants run for longer.

Germany's available generating capacity is falling rapidly from an overall 99 GW today to 90 GW in 2030, while peakload power demand is forecast to rise to 120 GW over the same period, driving by an electrification of industry and the transport sector.

Not enough dispatchable power

If plans to exit coal and nuclear are enacted, there could be only 80 GW of dispatchable capacity installed by 2035 and just 80 GW by the end of the decade. Even if ambitious goals for a renewable-build out are reached, McKinsey calculations show that available

capacity will decline by 9 GW to less than 90 GW by the end of the decade.

"The combination of decreasing secured capacity and increasing peak load due to electrification can lead to supply gaps," said Thomas Vahlenkamp, senior partner at McKinsey. "Even with a nationwide switch to renewables, further levers of action are needed to stabilise the system" he argued, suggesting a lifetime expansion of coal power plants, more battery storage and electricity imports.

The German network regulator (BNetzA) expects that 21 GW of new gas-fired power generation capacity will be added to the grid by 2030. If that happens, the supply gap

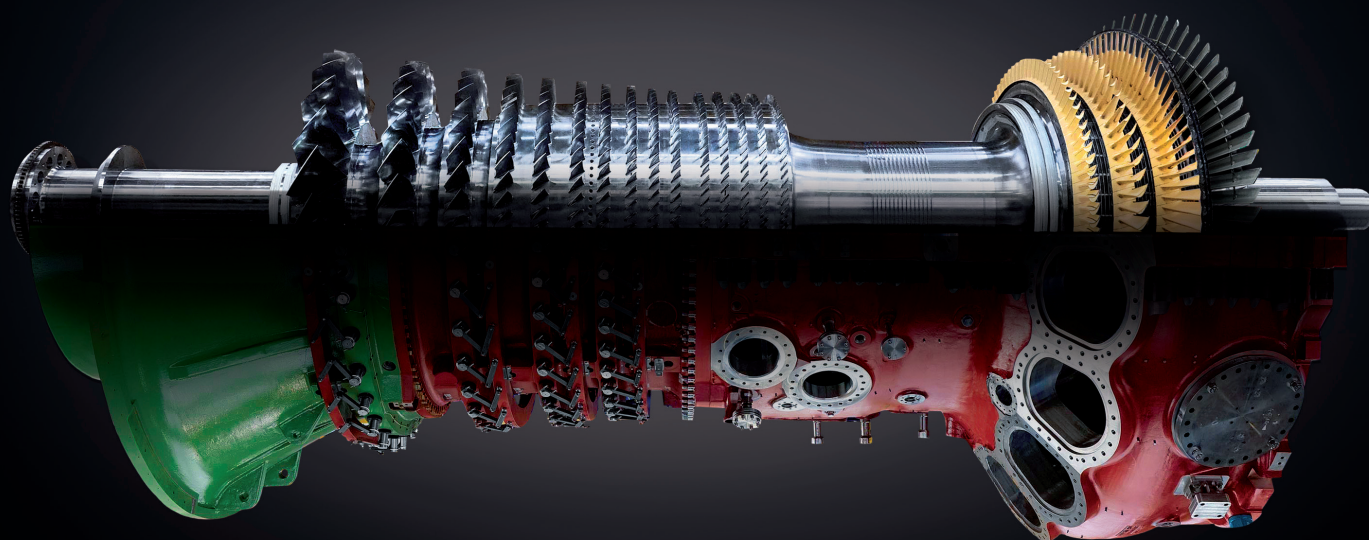
would be closed – but McKinsey reckons it is not likely. By 2025, only 3 GW of additional capacity will be available that is already under construction and analysts doubt that a further 18 GW of new capacity will get through planning permission, approval and construction in the following five years.

Investment in new gas generators is slowly forthcoming as uncertainty abounds about how long these power stations will be permitted to run on natural gas and how cheap hydrogen can be sourced to decarbonise operations. McKinsey hence sees a gap of 10 GW in dispatchable generating capacity remaining in the 2030s. ■

— ITALIAN ENERGY —

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Graforce launches plasmalysis tech to convert LNG to hydrogen

German technology firm Graforce has launched a methane electrolysis, or plasmalysis technology which converts LNG into hydrogen. This enables large gas users like power generators to switch to clean-burning hydrogen without changing their energy supplier or method of fuel transporting – as proven in a cooperation with Kawasaki Gas Turbine Europe.

In January, Graforce teamed up with Kawasaki Gas Turbine Europe. Within the plasmalysis plant solution, carbon-free hydrogen is produced from biomethane, natural gas, LNG or LPG. This is converted to electricity in Kawasaki's hydrogen gas turbine and reused in the plasmalysis to produce hydrogen.

"Once started, the whole system requires

no further electricity," Dr. Jens Hanke, Graforce CTO pointed out.

Technically speaking, the modular plants use a high-frequency plasma field – generated by renewable electricity – to split hydrocarbons like methane into their molecular components: hydrogen and solid carbon. Compared with water electrolysis, plasmalysis requires only one-fifth the energy to produce the same amount of hydrogen. A single 20 MW plant can convert about 70,000 metric tons of LNG into hydrogen per year and save about 200,000 metric tons of CO₂.

Hydrogen can be burnt to generate emissions-free electricity and heat or used in the chemical industry. Since the CO₂ is sequestered in products over the long term, the

plasmalysis technology is also the "first market-ready alternative to carbon capture storage," Hanke claimed. "We cannot do completely without fossil fuels yet. But the EU can still achieve its decarbonization targets if LNG, LPG or natural gas are no longer burned but converted into hydrogen and solid carbon," he concluded. ■



View into Graforce's methane-electrolysis plant

Worley to deliver engineering for UK East Coast Hydrogen Pipeline

Australian-based Worley has secured a contract to deliver the pre-front-end engineering design (FEED) and a technical survey for the UK's East Coast Hydrogen Pipeline (ECHP). The project is envisaged to connect 10 GW of hydrogen produced in the Humber and Teesside industrial hubs to the UK gas network with a view to transition natural gas supply to hydrogen.

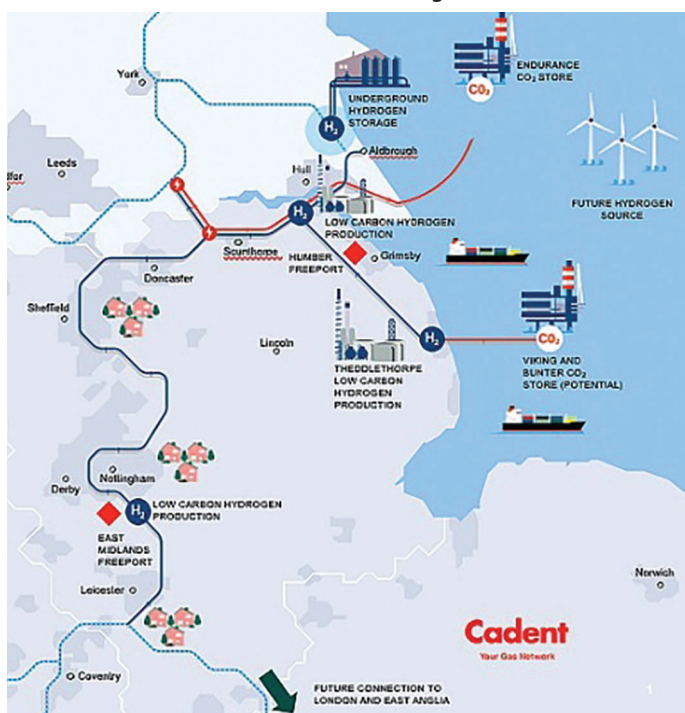
The East Coast Hydrogen Pipeline is led by East Coast Hydrogen (ECH2) which delivers the project in partnership with Cadent, Northern Gas Networks

study will help Cadent how to transition natural gas supply into hydrogen and provide crucial information on the pipeline's potential route and sizing. ■

and National Gas Transmission in support of the UK government's 2050 net-zero targets.

With this project, the UK gas distributor Cadent aims to create a 240-km hydrogen network between Humber-side and Northampton that will address the UK's future decarbonised energy demands. Part of the hydrogen will be used for power generation, with several utilities looking to convert their gas power stations to be able to combust the clean-burning fuel.

Worley's pre-FEED



Ceres trials SOEC to produce green hydrogen at Bosch's Stuttgart site

UK fuel cell maker Ceres Power has agreed with Linde Engineering and Bosch to validate the performance and cost of a solid oxide electrolysis (SOEC) system at a Bosch site in Stuttgart, Germany. Tests will start in 2024 and Ceres is confident its electrolyzers can deliver green hydrogen at <40kWh/kg, around 25% more efficiently than incumbent lower temperature technologies.

By 2035, global energy consumption is expected to rise by 30% and meeting this increased demand for electricity solely with large, centralized power stations will not be possible. Fuel cells, generating electricity from natural gas or hydrogen, can help accelerate a network of distributed power supply.

The three companies are hence preparing a 2-year demonstration with a 1 MW solid oxide fuel cell system, starting from 2024. The demonstration is meant to validate the SOEC at a system level – a vital basis for commercialisation.

Ceres is committed to spend £100 million to further develop its fuel cells and its first 100 kW electrolyser module is currently on test. The company claims its technology produces hydrogen at efficiencies of more than 20% higher than other technologies, and by making use of waste heat in industrial processes this efficiency can be boosted to a range of 80% to 90%.

Combined with Linde's capabilities in industrial process engineering of chemical plants and Bosch's expertise in product industrialisation and mass manufacturing, the companies are aiming to evaluate and qualify SOEC technology for large-scale industrial applications. ■

Engie chooses Ansaldo Energia to upgrade Leinì CCGT in Turin

The French utility Engie has contracted Ansaldo Energia to upgrade the 380 MW Leinì combined-cycle power station in the northern Italian city of Turin. Works will begin in February 2024, which will see Ansaldo provide the plant with a new AE 94.3A gas turbine and a related WY23Z generator by October next year.

The Leinì plant in 2022 produced about 2.1 TWh of electricity for the national electricity system and 55.5 GWh of thermal energy for the district heating network of the City of Settimo Torinese, also owned by Engie.

Gelu Rapotan, director of ENGIE Production singled out the partnership with Ansaldo Energia as an "example of ENGIE's willingness to invest in the research of technological innovations that make the plant a truly virtuous pole in terms of sustainability, flexibility and energy transition."

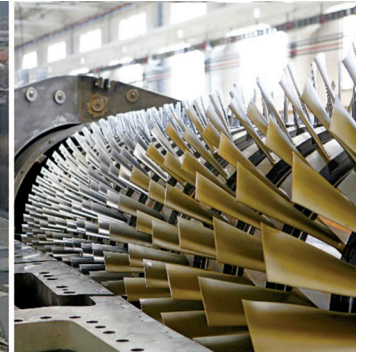
Build in 2007, the Leinì CCGT will undergo a turnkey replacement of the entire gas power assembly, including the gas turbine, the generator with the related auxiliaries, along with all the required site activities. The AE 94.3A gas turbine model

to be installed at Leinì has accumulated more than 4 million hours of operation with ever-increasing performance, the manufacturer underlined.

Marco Lovisolo, Ansaldo Energia senior vice president Sales & Marketing said the order win confirms an "ever more fruitful collaboration. The Italian manufacturer built the Leinì power plant in 2007 and maintained it with a timely service, aimed at ensuring the maximum efficiency. "With this project we will in-

stall a renewed and upgraded machine, backed by a proven experience," Lovisolo.

For Engie, Ansaldo Energia built the three power plants of Voghera, Rosignano and Leinì in Italy, followed up with upgrade and maintenance activities over a period of 20 years. ■



Leinì CCGT and Ansaldo turbine

GE supplies HA-equipment for Damco's 840 MW power plant in Greece

Damco Energy, part of Greek Copelouzos Group, has ordered GE's HA combined cycle plant equipment to power the new 840 MW Alexandroupolis combined-cycle power plant. The package includes a 9HA.02 gas turbine, which will be GE's second heavy duty gas turbine in Greece and the CCGT is scheduled to start operation in 2026.

Public Power Corp and DEPA will each participate with 51% and 29%, respectively, in the share capital of Alexandroupolis Electricity Production SA, the company that will finance, construct, own and operate the new power plant. DAMCO has also been nominated as the project's EPC contractor.

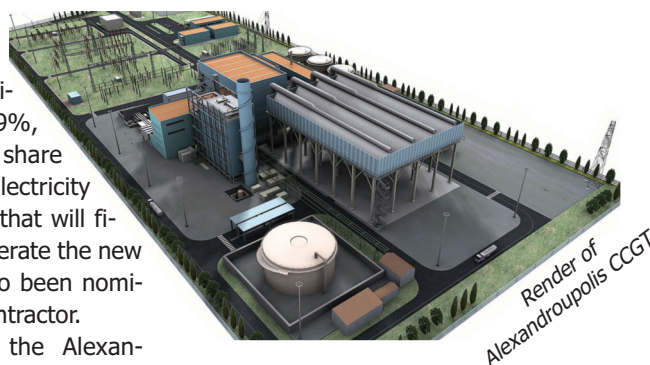
Electricity generated by the Alexandroupolis CCGT is meant to support Greece's energy transition. Natural gas-fired combined cycle power plants are the lowest emitting fossil fuel power plants, whether measured based on CO₂, SO_x, NO_x, particulate matter, or mercury.

"Alexandroupolis power plant is in the crossroads of the natural gas network of the Balkan region" commented Mr. Andreas Diamandopoulos, General Manager, DAMCO. "It was crucial for us to select the most advanced technology, such as GE's 9HA.02 gas turbine, to help secure the lowest cost of conversion from gas to electricity."

The plant will be powered by an engineered equipment package that includes a

GE 9HA.02 gas turbine, an STF-D650 steam turbine, a W88 generator, a triple pressure with reheat Heat Recovery Steam Generator (HRSG) and Mark* VIE Distributed Control System (DCS) software solution.

GE has been working with Copelouzos Group for more than four years and the latest project combines the company's turnkey expertise with its combined cycle power plant technology. GE introduced H-Class technology to the industry 27 years ago and the company's 9HA.02 gas turbine is highly fuel flexible and able to operate on a variety of fuels, including blends of hydrogen and natural gas. ■



NFE to provide 150 MW power capacity and gas supply for Puerto Rico

New Fortress Energy (NFE) has entered into agreements with Weston Solution to install and operate 150 MW of flexible power generation capacity at the Palo Seco power plant in Puerto Rico and supply natural gas to fuel the plant. The dual-fuel generator is meant to supply temporary power to enable repair works of Puerto Rico's electricity grid.

In late January, the NFE-affiliate Genera had been selected by the Puerto Rico Electric Power Authority (PREPA) to operate, maintain, decommission and modernise the state's thermal power gen system of about 3,600 MW. The selection was made in a competitive tender, based on contender's operational and technical expertise, approach and methodology and estimated cost savings. ■



Palo Seco power plant



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