

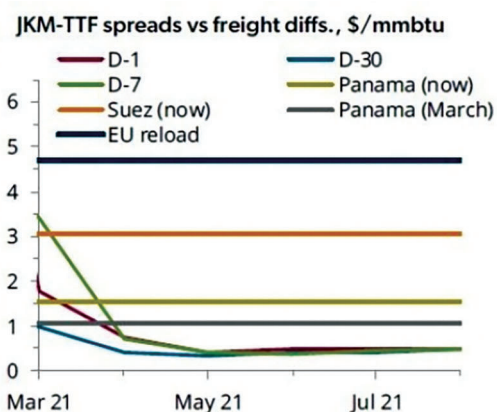
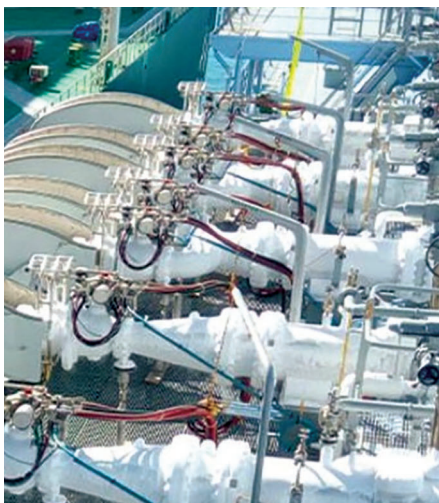


Japan conducts inquiry into power price spike, LNG winter storage

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 presented the plan for a new LNG framework at a ministerial subcommittee on February 15. "As [METI's] Agency for Natural Resources and Energy, we will rigorously verify factors behind the recent incident, and we intend to take necessary measures to prevent recurrence of a similar incident," he pledged.

There is strong need bridge the gap between two weeks of LNG stocks that utilities currently keep and the one month of LNG supply needed on average for a newly purchased cargo to be delivered.



Source: CME, Fearnleys, Energy Aspects
*freight diffs are the increases in freight costs to send cargoes to Northeast Asia instead of Europe

ered. METI stressed this issue needs to be addressed, particularly after the experience of the recent electricity shortages.

Stocks of LNG held by Japanese utilities fell to a low of 1.16 million tons on January 11 but recovered to 1.43 million tons as of January 17, according to METI data. This indicates that importers

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ERCOT raises energy prices in Texas as winter storm causes blackout

The Electric Reliability Council of Texas (ERCOT) has decided to raise energy prices after a winter storm left more than 4 million people without electricity in Texas. The grid could not cope with the sudden demand spike, while fuel shortages forced some utilities to implement rolling blackouts, propelling up power prices.

ERCOT officials had to admit today the still have "no idea" when the power outages will end. It may well be days before all households will have full electricity restored, the grid operator said without specifying further.

The Texan governor Greg Abbott called for a review of ERCOT's preparations prior to the latest winter storm, criticising the fact that the grid operator had proven to be "has been anything but reliable over the past 48 hours." He also levied part of the blame for outages on private power generators.

In a warning to customers, Texas Gas Services informed that "demand for natural gas continues to outpace supply," adding it will "take time for our suppliers to get their natural gas wells back online." That's why it is so important for everyone to



Texan power lines in the snow

continue to minimize the amount of natural gas they are using, the grid operator said, stressing the system is "at a critical point."

Lack of interconnection capacity

Texas is the only US state with a stand-alone elec-

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managed to balance the supply and demand in recent weeks.

Utilities had to pay dear for LNG

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 million British thermal units (MMBtu).

In contrast, the Japan Korea Marker

(JKM) April-21 contract was last seen trading substantially lower at \$6.25 per MMBtu. The cheap JKM forward prices indicate 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. By the end of February, the London-based consultancy

Energy Aspects sees Japan's aggregate stocks to have recovered to around 3 million tons, which is still down from the five-year average of 4.1 million tons.

Restocking to normalize gas inventories is expected to further boost LNG demand over the coming weeks and months, analysts say. And as more LNG is gradually being made available in the Pacific Basin, demand will also come from industrial segments as they are seeking to make up for lost output during recent supply shortfalls. ■

Stranded assets – long-term risk for fossil fuel exporters, Fitch warns

Fitch Ratings has warned that oil and gas exporters face a growing risk of loss of GDP, government revenue and export receipts as more and more upstream assets are downgraded, or become stranded, as the energy transition progresses. Coal will suffer a greater loss of market share than oil and natural gas.

Though the extent and speed of the decline in demand for fossil fuels is uncertain, analysts underlined that excess potential global supply will weigh on prices, potentially compounding the loss from lower volumes.

High-cost producers will be squeezed out first," said Fitch Rating's managing director Ed Parker. He expects coal mining companies will face a "faster and fuller loss" of market share than oil and particularly gas producers.

Sovereigns with strong balance sheets and potential to diversify their economies are better-placed. However, for the most-exposed sovereigns and those that do not adequately prepare for it, the climate

change related stranded-asset risk is likely to lead to rating downgrades.

Energy transition similar to oil price shock

Under a plausible scenario, Fitch Rating expects the green energy transition will be a similar shock to oil revenue as occurred in

2013-2016 and again in 2018-2020. "During this period two oil exporters defaulted and a further three were downgraded by at least four notches," Parker explained.

Being much slower, the energy transition will give sovereigns more time and capacity to adjust, but the change will be permanent. A simulation on Fitch's Sovereign Rating Model shows this could lead to a fall in the SRM (surrogate reservoir model) output of a well by around one rating notch by 2040, and two to three notches by 2050 for a major oil exporter.

The downgrade of the SRM output will, in turn, impact on the credit rating of oil and gas producers which impacts their capacity to refinance their operating. The rise in financing costs for coal assets and political instability in some countries amplifies these challenges. ■



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tricity grid without interconnections to other market zones. This lack of interconnection capacity means that Texas is at greater risk of blackouts, given that almost no electricity can be imported from other regions in the event of a sudden spike in demand.

ERCOT, the Texan grid operator, is also not under any federal oversight and is largely responsible to manage its own sources of energy supply, transmission as well as power generation capacity.

Daily gas deliveries surge

The cold freeze across has gripped Texas and Louisiana since the start of the week,

propelling up daily deliveries. Latest available flow data from the American Gas Association shows that on February 15, 68.9 billion cubic feet (Bcf) of natural gas flowed to residential and commercial sector, 27.5 Bcf to industrial, 39.7 Bcf to power generation and 9.8 Bcf was exported.

US pipeline gas exports have been substantially reduced, to make more supplies available north of the border, which in turn has put millions of households in northern Mexico at risk. Local utilities are starting to ration gas deliveries and reduce the runtime of gas peaking plants, which largely rely on imported gas. ■

Batteries in focus of President Biden's "Buy American" policy

President Joe Biden's "Buy American" policy mandates that half of the batteries for the federal government's fleet of domestic cars are made in the US. In contrast, Europe's has only a 40% local content threshold is for electric vehicles vs. petrol-based cars, but this will rise to a comparable 55% by 2027.

Similar as in the United States, governments in Europe are encouraging investment in battery factories to replace traditional engine plants. The aim is to shorten supply chains and keep the industry alive in competition with Asian rivals.

However, these political goals will be hard to realise given that China currently produces nearly 75% of lithium-ion batteries worldwide, and is building out its factories. So despite efforts in Europe and the US to encourage domestic battery production, analysts say "there has been a distinct lack of support for investment in the supply and refining of the raw materials to achieve this. In China, the opposite holds true."

Contest for key metals

But China does not have it all its own way in the contest for key metals used in EV production -- lithium, nickel and cobalt. "China remains hugely dependent on foreign miners, for example, for its supply of copper – the country is net short to the tune of around 9 million tons per annum (mtpa) – with only limited equity ownership of resources around the world," commented Gavin Montgomery and Milan Thakore from Wood Mackenzie's battery raw materials team.

"Just as with iron ore, despite considerable efforts China has struggled to significantly increase its share of global copper

resources," analysts added.

So, if the pace of EV production and ownership is to really take off in Europe and the US, must be a huge increase in the production and refining of the key metals to achieve this.

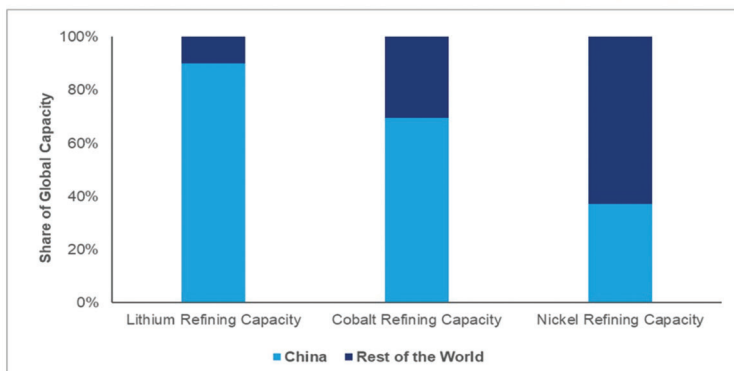
Wood Mackenzie's base case sees nickel production rise by almost 70% by 2040, while cobalt and lithium demand will increase by 200% and 600%, respectively, over the next two decades. And if the world decarbonises more rapidly, demand rises far faster.

Scramble to source cobalt from Congo

Eager to reduce its dependency on precious mineral imports, Chinese has made substantial efforts to increase its ownership of, and access to, these, from cobalt resources in the Democratic Republic of Congo (DRC) to lithium reserves in Chile and Indonesian nickel mines.

Almost three-quarters – and rising – of

China's share of global battery raw material refining capacity



Source: Wood Mackenzie Battery Raw Materials Service

woodmac.com

global cobalt production comes from the DRC, where western miners face prohibitive environmental, social and governance risks, analysts said, pointing out: "It is no coincidence that China's cobalt refining capacity almost exactly matches the DRC's share of global output."

Faced with potential tariff barriers, Chinese and other Asian battery manufacturers are expanding their footprint overseas. China's SVOLT has now confirmed it will build a 24-GWh plant in Germany, with cell production scheduled to begin in 2022, and module production the following year. And in other parts of Europe and the US, battery makers from South Korean and Japanese are striving to build new manufacturing capacity.

MAN to install first electro-thermal energy storage in Denmark

Danish utility DIN Forsyning has commissioned MAN Energy Solutions to supply a turnkey solution for heat generation at the Port of Esbjerg. Two electro-thermal energy storage (ETES) units will be installed in a new 50 MW district heating plant, operating on the principle of a CO₂-based heat pump.

The location at the Port of Esbjerg will allow the plant to use energy from nearby wind farms and seawater as a heat source. Once fully operational, it will supply up to 100,000 local inhabitants with 235,000 MWh of heat annually.

DIN Forsyning's new district-heating plant hence presents an emission-free alternative to the city's current, coal-fired power plant which covers about half of Esbjerg's district heating needs and is scheduled for closure by April 2023.

Carbon dioxide used as refrigerant

The ETES heat-pump system is a new version of MAN's electro-thermal energy-storage

system. It converts electricity into thermal energy, which is stored in the form of hot water and ice in insulated reservoirs, for use at a later stage to demand and margins. Alternatively, the heat can be converted back into electricity.

The novel feature of ETES is the use of toxicologically and environmentally safe carbon dioxide as a refrigerant for the entire system cycle. The CO₂-based heat-pump plant in Esbjerg will be the largest of its kind ever used in the world. Not only will it harnesses renewable energy, but also makes it possible to generate electrical balancing power to help stabilise the grid.

MAN's scope of supply for the project in Esbjerg covers the entire heat-pump sys-

tem, including the heat exchangers, the piping for the CO₂ and seawater cycles, the water pumps as well as the electrical infrastructure provided by ABB Switzerland and ABB Denmark.



An ETES heat pump will be at the heart of the new district heating plant at the Port of Esbjerg, Denmark.

German coal exit leaves cities out of heat, requires gas CHP build-out

The gradual shut-down of Germany's coal-fired power stations by 2023 will leave many urban areas short of heat that is also produced in these units. The economy ministry assumes a total of 14 gigawatts of gas combined heat and power (CHP) plants will have to be added by 2030.

"However, these power plants are not in sight," the German energy industry association BDEW warns.

Future security of supply with electricity and district heating largely depends on whether municipal utilities are prepared to invest in the modernization of gas CHP plants. But, according to the industry, "sufficient incentives for this build-out are missing."

The German government has passed laws for a staggered phase-out of both coal and nuclear capacity, which will significantly reduce the market share of the country's five largest utilities. The weigh and growth potential of the actors is changing as well.

RWE expands market dominance

Germany's largest utility by market share, RWE, is expected to remain "far ahead of

the other companies," a government investigation finds. Andreas Mundt, president of the Federal Cartel Office said

the regulatory oversight for the merger for RWE and E.ON has shown that RWE's electricity output is becoming indispensable to cover German electricity demand in a rising number of hours throughout the year. Further analysis by the Cartel Office in 2020 confirmed this view.

"The future development on the German power generation market is determined by the energy transition," he said, warning that "due to the progressive decline in generation capacities and the resulting market shortage, RWE could eventually cross the threshold of market dominance."

Operators of CHP plants and renewable power producers have seen their output



curtailed in 2020 because of grid congestion issues. Most of the electricity output, curbed by grid operators, came from offshore wind installations whose contribution increased 20% in the first quarter of last year due to very windy weather conditions. Over the past years, operators of wind and solar power installations, as well as CHPs, were entitled to an estimated 710 million Euros in compensation payments because they were mandated to not run their plants at full capacity due to grid bottlenecks.

Costs for all the different grid stabilisation measures – redispatch, counter trading, capacity reserve – remained stable at around 1.9 billion Euros, the report states. ■

Energy Transfer expands focus on 'alternative energy projects'

US oil and gas midstream company Energy Transfer has created a new business group, led by Tom Mason, to develop alternative energy projects. In focus will be solar and/or wind farms (either through PPAs or partnership with third party developers) and hydrogen gas opportunities – when they make economic sense.

Future hydrogen production projects are meant to make use of Energy Transfer's extensive natural gas pipeline system, which consists of more than 90,000 miles of pipelines crossing 38 US states.

Energy Transfer's latest partnership sup-

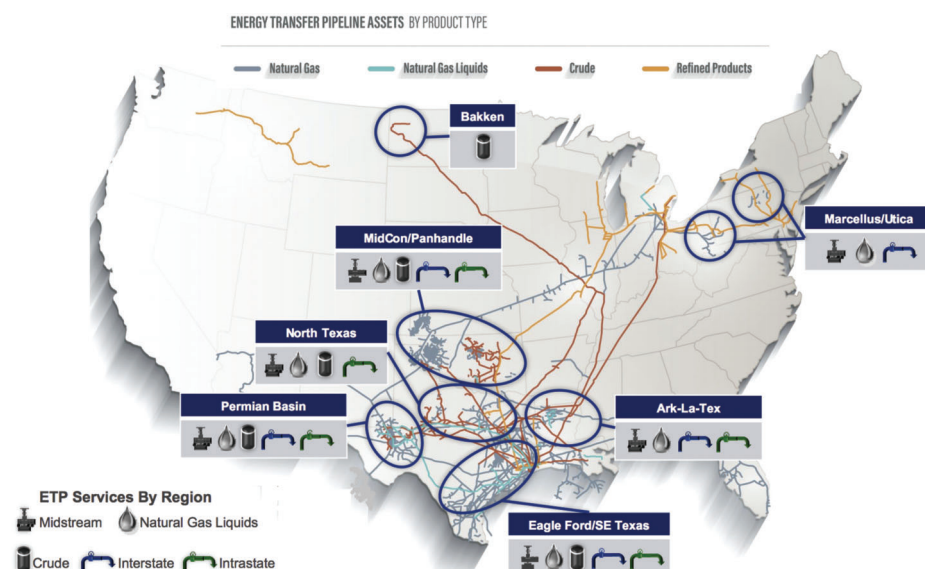
ports the construction of the Maplewood-2 solar PV project in West Texas, developed together with Recurrent Energy. The 28 MW solar project, due in service in Q2-2021, is the utility's first-ever dedicated solar power purchase contract.

The Dallas-based midstream company

has been striving to reduce its emission footprint over the past 10 years, e.g. by installing dual drive compression system along some of its main gas pipelines. Each dual drive compressor can switch back and forth between an electric motor and a natural gas engine to manage changes in electrical demand.

In 2020 alone, this Dual Drive Technology reduced Energy Transfer's carbon dioxide emissions by over 632,000 tons. Other emission reduction measures in place range from the use of emissions prevention technology such as vapor recovery units and stabilisers at natural gas process plants, to thermal oxidisers and direct injection systems to reduce or prevent methane emissions.

Energy Transfer not only owns and operates an extensive network of US oil and gas pipelines. Through its ownership of Energy Transfer Operating, it also owns Lake Charles LNG Company, as well as distribution rights and shares in of Sunoco as well as a stake in USA Compression Partners. ■





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MHI invests in C-Zero to produce hydrogen from natural gas

Mitsubishi Heavy Industries (MHI) has invested into the California-based hard tech startup C-Zero to upscale and commercialise of the firm's drop-in decarbonisation technology. It produces hydrogen via methane pyrolysis, in a process often referred to as 'turquoise hydrogen.'

Hydrogen produced via methane pyrolysis, or 'turquoise hydrogen', combines the benefits of both 'blue hydrogen' (SMR with CO₂ sequestration) and 'green hydrogen' (produced by splitting water via electrolysis) by being low cost and low emissions.

Zach Jones, C-Zero's chief executive said the investment will help the company to enter the next stage of growth, outlining the aim is "to scale up a technology with the potential to decarbonise over a quarter of the world's energy consumption."

Thermo-catalysis

The technology, initially developed at the University of California, uses innovative thermo-catalysis to split methane – the primary molecule in natural gas – into hydrogen and solid carbon. The hydrogen can be used to help decarbonise a wide array of existing applications, including hydrogen production for fuel cell vehicles, while the carbon can be permanently sequestered.

When renewable natural gas is used as the feedstock, C-Zero's technology can even be carbon negative, effectively extracting carbon dioxide from the atmosphere and permanently storing it in the form of high-

density solid carbon.

"Over \$100 billion of commodity hydrogen is produced annually," said Carmichael Roberts, Breakthrough Energy Ventures. "Unfortunately, the overwhelming majority of that production comes from a process called steam methane reforming, which also produces large quantities of CO₂. Finding low cost, low emission methods of hydrogen production – such as the one C-Zero has created – will be critical to unlocking the molecule's potential to decarbonise major segments of the agricultural, chemical, manufacturing and transportation sectors."

Consortium of investors

The investment was conducted via MHI America (MHIA), the US arm of the Japanese manufacturing group, with the strategic aim of examining the potential of using Mitsubishi's hybrid turbines and other equipment for the production and use of hydrogen.

MHI joins a consortium of investors, including Breakthrough Energy Ventures, Eni Next and AP Ventures.



"We are committed to expanding the hydrogen value chain from production to utilization by developing technologies such as the hydrogen gas turbine, and by partnering with innovative technology and solution providers," said MHIA President, Yoshihiro Shiraiwa. "We believe C-Zero's technology will lead to more solutions that help us and our customers achieve our decarbonisation goals."

Eni is also investing in the C-Zero technology and a company spokesman commented: "Methane pyrolysis is very interesting to us, as clean and low CO₂ hydrogen can be produced with limited consumption of energy and no water usage. Scaling-up this process will potentially be an enormous advantage to produce hydrogen for energy or commodity chemical applications." ■

Maersk upgrades two drilling rigs with Siemens hybrid power plants

Maersk Drilling has commissioned Siemens Energy to upgrade two CJ70 jack-up drilling rigs in the North Sea with hybrid power plants that include lithium-ion energy storage. The rigs – Maersk Intrepid and Maersk Integrator – were retrofitted with BlueVault batteries, allowing the operator to reduce the runtime of onboard combustion engines.

Offshore rigs tend to have high variable power consumption for drilling, dynamic positioning, and station keeping - hence hybrid solutions are attractive to reduce peak demand and safe fuel costs. "The diesel-electric solution with BlueVault energy storage will reduce the transient load on generator sets, meaning that basic requirements can be met by fewer engines operating at a higher load, thus decreasing carbon emissions," Siemens Energy explained.

First rigs powered by hybrid solution

Today, the Maersk Intrepid and Maersk Integrator rigs are the first jack-ups to employ a combination of hybrid, low-emission solutions on the Norwegian Continental Shelf.

The hybrid system optimises the use of the combustion engine and energy storage in order to maintain an operational setpoint where energy efficiency is maximized.

Initial data point shows that Maersk Intrepid in the first month of operations with the full set of upgrades installed was able to reduce CO₂ emissions by 25% and NO_x emissions by 95% compared to the baseline average for the rig.

Project financed through Norway's NOx Fund

Maersk Drilling has applied for project funding through the NO_x Fund – a Norwegian fund dedicated to reducing NO_x emissions. The fund is contributing a grant of up to 80% of project costs, in the hope that the ultra-harsh jack-ups will be a benchmark for

the offshore industry to reduce emissions.

The global fleet of jack-ups is nearly 500 units, and Siemens Energy believes that approximately 300 of these may be eligible candidates for similar upgrades with BlueVault batteries. Upgrading all of these drilling rigs with batteries would potentially reduce emissions by more than 1 million tons of CO₂ per year, equivalent to annual emissions from 725,000 automobiles. ■

Seadrill's West Mira drilling rig will be the world's first modern drilling rig to operate a low-emission hybrid power plant.



Wärtsilä-built CHP helps utility in Mainz reach its green energy goals

Wärtsilä's newly completed combined heat and power (CHP) plant to reach its green energy goals. The CHP provides 100 MW of electricity and feeds the excess heat into the local district heating network - enough for 40,000 family homes.

Wärtsilä supplied and built the plant on a full engineering, procurement, and construction (EPC) contract. The handover to the customer took place on 23 December. Services provided include on-site support and remote online monitoring to ensure the CHP's produces sufficient electricity and heat at all times, especially during periods of high demand in winter

Fast-starts in 2.5 mins

Driven by ten gas-fuelled Wärtsilä 34SG engines, the CHP reaches a high operational flexibility which allows starting and stopping the engines in 2.5 minutes. These quick-starts can be repeated without limitation which allows the operator KMW to provide essential grid balancing support to cope with the rising supply of intermittent wind and solar energy.

It also allows KMW to operate in the short-term balancing markets, since power output can be quickly adjusted to respond to fluctuations in the power demand, as signalled by the electricity price.

"The start of commercial operations for the Wärtsilä CHP plant provides us with a modern, agile, low-carbon system

capable of utilising green energy assets to the full. Fast acting power generation is essential in today's energy markets, and this plant meets all our requirements in this respect," said Jörg Höhler, chief technical officer at Kraftwerke Mainz-Wiesbaden AG.

Low-carbon system

As part of its climate action plan, the German government vowed to raise the share of electricity produced by CHP plants to 25% of the country's total power mix by 2025. Germany, like the European Union, aims to become greenhouse gas neutral by 2050 and is targeting to cut emissions by at least 55% by 2030, compared to 1990 levels. ■



Aerial view of Kraftwerke Mainz-Wiesbaden AG power plant in Mainz

Colorado Springs Utilities buys modular GE gas turbines to replace coal units

Colorado Springs Utilities has ordered six of GE's LM2500XPRESS aero-derivative gas turbines to bridge the supply gap as the Martin Drake coal-fired power plant will be retired by 2023. A new transmission line to power the downtown area of Colorado is due completed in 2025.

In compliance with the state of Colorado's goal to reduce emissions from transport and power generation, the utility committed to retiring the coal-fired Martin Drake Power Plant by Dec. 31, 2022—12 years earlier than previously planned.

Units due onstream by summer 2022

GE said its LM2500XPRESS units will help Springs Utilities acquire the flexibility they need to bring more renewables onto their system and move forward with the retirement of Martin Drake. The 34 MW units are

expected to start commercial operation by the summer of 2022. The mobile units can be moved on trailers, so that they can eventually be relocated to other sites in the Colorado Springs area.

GE said its LM2500XPRESS power generators are 95% factory assembled into simplified modules and provide a "plug and play" concept that can be installed in less than three weeks. Each power block comprises a GE LM2500* aeroderivative gas turbine modular package, gas compressor and emissions control system. In addition, there is a black start diesel generator included to provide start-up capability in case of

Turboden helps decarbonise GASCO compressor station in Egypt

The largest high-temperature Organic Rankine Cycle (ORC) system ever built will be installed at the GASCO Dahshour gas compressor station in Egypt. Turboden's ORC unit (28 MWe) is coupled with two Siemens' electric motor driven compressors (20 MWe) and by recovering the exhaust gas heat, it generates 192 GWh per year of fuel-free electricity.

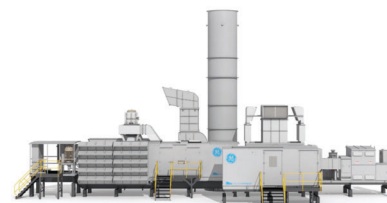
This fuel-free energy, powering two 10 MWe compressors, allows GASCO to save 65 million of cubic meters of natural gas per year and consequently avoids the equivalent of 120,000 ton CO2 emissions per year.

The project - set to become the highest high-temperature ORC system ever built - demonstrates that ORC systems can help midstream companies to decarbonise their operations.

EBRD funding

GASCO, the state-owned gas grid operator in Egypt, is investing to improve the efficiency of its infrastructure. The Dahshour project is financed by the European Bank for Reconstruction and Development (EBRD).

"As the system can work completely disconnected from the electricity grid and does not need water, it is suitable to be installed in remote or deserted areas," said Paolo Bertuzzi, CEO at Turboden. Replicating the green gas compressor station elsewhere in Egypt can help decarbonise the local oil and gas industry. ■



grid events.

The new small and mobile generators are built on GE's proven LM2500* aeroderivative gas turbine technology. In simple cycle configuration, it delivers 34 MW and achieves up to 39.5% of efficiency. In a combined cycle configuration, it delivers up to 47 MW with up to 54.4% of efficiency. ■

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