



Fuel cell market breaks the 1 GW global capacity barrier

The hydrogen fuel sector managed to break the 1 GW global shipment barrier in 2019 when a total of 1.1 GW were transported, mostly to Asian markets. Fuel cell vehicles and energy storage remain the largest demand drivers, according to E4tech research, with Japan's Toyota and South Korea's Hyundai accounting for two thirds of total shipped capacity.

When factoring the in burgeoning bus, truck and van markets, vehicles account for over 900 MW of the 1.1 GW total, according to E4tech's latest Fuel Cell Industry Review.

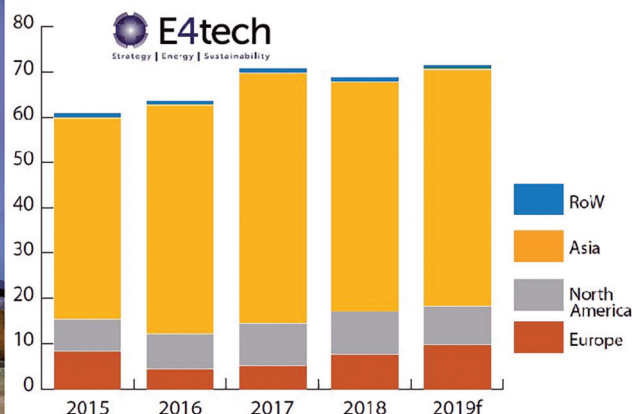
The remainder consists of stationary systems – of which US and Korean power generation units make up the bulk – and tens of thousands of Japanese CHP units installed in apartments.

Fuel cells tech ready for commercialization

"There is a real sense that the industry is on the cusp of something great. Fuel cells are proven from a technical perspective, and blowing past the 1 GW mark is a vindication of that," said David Hart,



Shipments by region of adoption 2015 - 2019 (1,000 units)



director, Fuel Cells & Hydrogen at E4tech.

In 2020, the sector is expected to enter a new stage characterized by rapid commercialization and infrastructure build out. "If the 2010s can be seen as the breakout decade for the battery, the 2020s will see the ascendancy of the fuel cell. Just in time, too: climate change targets are looking more urgent and challenging than ever, and we need a full range of technologies to meet them," Mr Hart commented.

At the same time, the broader hydrogen sector is starting to expand as recognition grows that some applications, like heat, will

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Henry Hub spot gas prices fall to 3-year low despite rise in LNG exports

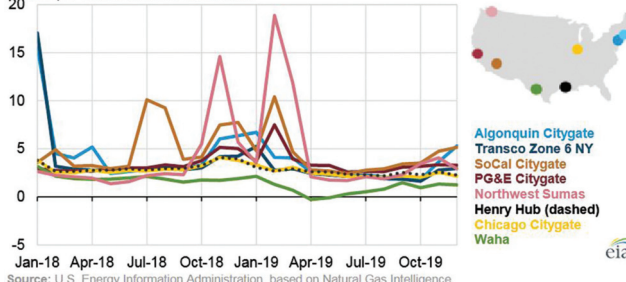
Spot gas prices at the U.S. benchmark Henry Hub in Louisiana have fallen to their lowest level in the past year since 2016 as domestic production keeps growing. "Lower natural gas prices in 2019 supported higher consumption – particularly in the electric generation sector – and higher natural gas exports," EIA analysts commented.

Spot prices at the national benchmark Henry Hub in Louisiana averaged \$2.57 per million British thermal units in the past year, about 60 cents per MMBtu lower than in 2018 and the lowest annual for three years. According to EIA figures, monthly average natural gas prices at most key regional trading hubs in 2019 reached their highest levels in February, and they were relatively low and stable from April through December.

In the US Northeast, additional imports of LNG into New England limited price spikes during the winter of 2018-2019.

Despite a cold snap in the Midwest in February 2019, natural gas prices at Chicago Citygate were

Monthly average natural gas spot prices at key trading hubs (Jan 2018-Dec 2019)
dollars per million British thermal units



Source: U.S. Energy Information Administration, based on Natural Gas Intelligence

lower than during previous extreme weather events. "However, in the Pacific Northwest, unseasonably cold weather at the end of winter coupled with regional supply constraints and decreased storage inventories led to significant price spikes at the Northwest Sumas hub in March," analysts commented.

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be difficult to fully electrify. This supports and complements fuel cell growth.

Strongest demand growth in China and Korea

Asia remains the largest market for fuel cells, accounting for 680 MW, driven strongly by Hyundai NEXO sales into Korea and by Korean stationary power. Fuel cell vehicles deployed in Asia in 2019, including trucks and buses in China, constitute

50% of the total shipped fuel cell capacity worldwide.

The NEXO also accounts for some growth in European capacity, which rose from 41 MW to 69 MW in 2019. However, the biggest market outside of Asia is North America, which saw shipped capacity of 384 MW – down slightly from 425 MW in 2018, but expected to rebound in 2020.

"To succeed, the fuel cell industry will need to see the supply chain mature quickly

enough to deliver on expectations, and to allay any remaining safety concerns. But the opportunity is huge, big players are investing very seriously in hydrogen, putting the pieces into place to make it work," Hart noted.

Once that happens, fuel cells will rank as an established technology, feeding not just into the success of today's products and systems, but featuring in the designs of tomorrow's innovators and entrepreneurs. ■

Japan – the 'odd one out' on coal power plant new-builds

The Japanese government keeps watering down its green energy goals, bowing to cost pressure in the face of slower macroeconomic growth. Ambitious targets to decrease gas and coal generation to 27 percent and 26 percent shares, respectively, and offset that lost capacity with nuclear and renewables, are no longer being pursued.

As thermal coal is a cheaper fuel than regasified LNG for power generation, Japanese utilities are looking to build new coal power plants and have decided not to renew some LNG import contracts after expiry. Hence, LNG shipments to Japan in 2019 already fell by nearly 12 percent to around 72.8 million tonnes per annum (mtpa), while cargoes headed for China increased by 37.5 percent to just over 74.1 mtpa over the same period.

By the end of 2020, Japan is likely to have lost its position as the world's No.1 LNG importer to China. Analysts noted that Japanese energy companies are currently "well-contracted in LNG" until around 2023.

increasing restrictions on financing and building coal. As such, we expect this policy target and such a robust share of coal in the generation mix will be increasingly difficult to sustain, which would improve the outlook for LNG," commented Wood Mackenzie senior analyst, Lucy Cullen.

In terms of demand, analysts expect Japan's LNG imports will remain above 70 mtpa through much of the 2020s, and may even exceed 60 mtpa until at least 2040.

So Japan is set to remain the world's No.2 LNG importer, after China, Ms. Cullen stressed, suggesting: "The Japanese market still provides ample opportunities for LNG sellers, particularly as existing contracts expire."

Risk of missing renewable targets

Aggressive investments into new wind and solar power capacities is meant to boost Japan's renewable energy share to 22-24 percent of its 2030, but analyst warned that too little effort is being made to grid-integrate the influx of intermittent green energy supply.

On the nuclear front, Japan restarted five plants last year alone. With next restarts scheduled for the mid-2020 and 2021, this will put downward pressure on LNG import requirements in the early 2020s. "We assume 15 reactors will be back online by 2030, accounting for 12 percent of power generation, much lower than the official target of 20-22 percent," Cullen said. ■

Public opinion turns against coal

Environmentalists have brand-marked Japan as "an outlier" given that it is one of the very few developed power markets that still prioritizes construction of new coal capacity. But the government's pro-coal policy targets seem to be misaligned with public sentiment and rising concerns about air pollution.

"The tide appears to be turning with



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Exports keep growing

Natural gas exports - both by pipeline to Mexico and as LNG - continued to grow. U.S. natural gas exports to Mexico by pipeline averaged 5.1 billion cubic feet per day in the first 10 months of 2019, 0.4 Bcf/d more than the 2018 average.

Most of the new pipelines placed in service in 2019 were located in the South Central and Northeast regions. Analysts noted these pipelines provide additional takeaway

capacity out of the Permian and Appalachian supply basins and will serve growing demand for LNG exports, pipeline exports to Mexico and US natural gas-fired power generation.

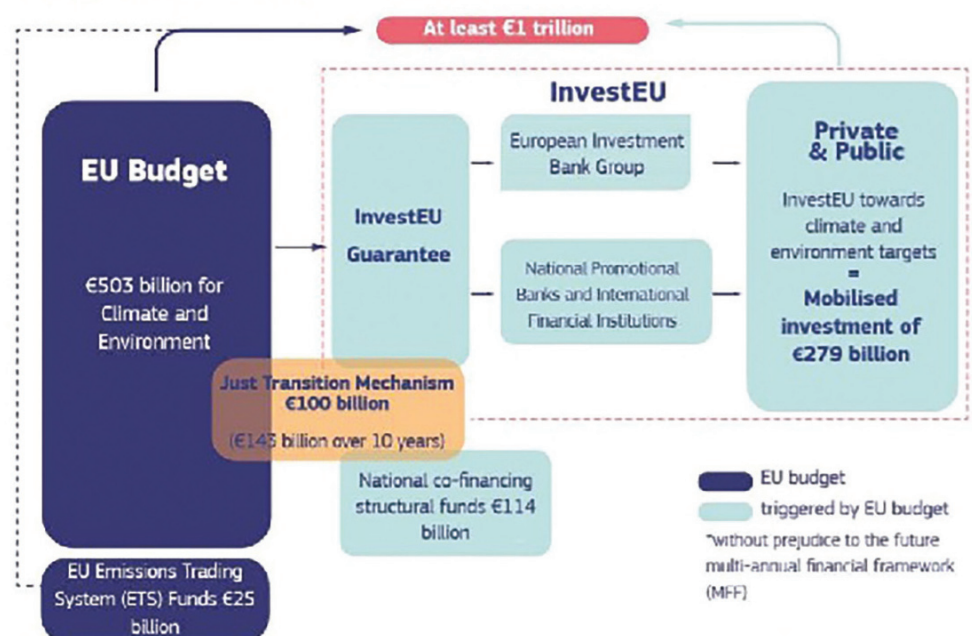
Additional pipeline takeaway capacity in the Permian region eased some infrastructure constraints and increased regional prices at the Waha hub in western Texas after six consecutive months of prices lower than \$1 per MMBtu (March through August). ■

Germany reluctant to grant additional funding to EU's Green Deal

The German finance ministry has made clear it will not pay more into the EU budget to bolster the Commission's ambitious €1 trillion Green Deal. The ministry said if the EU budget remained at 1 percent of economic output, this would give "enough leeway for mustering the necessary funds through priority setting."



WHERE WILL THE MONEY COME FROM?



*The numbers shown here are net of any overlaps between climate, environmental and Just Transition Mechanism objectives.

Moreover, the European Investment Bank (EIB) does not need a capital increase as European climate targets can be reached "with the EIB's existing resources," the German finance ministry commented. Under the Commission's proposal, the EIB was meant to grant a public sector loan, backed by the EU budget, to mobilise between €25 and €30 billion of investments.

Where will the funds come from?

On January 14, Ursula von der Leyen, the new President of the European Commission unveiled its financial plan to shift Europe towards carbon-neutrality by 2050.

Of the staggering €1 trillion funding for the EU Green deal, some €503 billion will come from the EU budget, plus some €25 billion from the EU emission trading system (ETS) funds. InvestEU, an umbrella organization of European investment banks and national banks are hoped to help mobilize private sector monies of at least €279 billion.

To ease the burden in Europe's traditional coal regions, a 'Just Transition Mechanism'

has been set up to help mobilise at least €100 billion over the period 2021-2027 in the most affected regions by alleviating the socio-economic impact of the transition. This fund will receive €7.5 billion of „fresh EU funds," the Commission pledged, with another €30 and €50 billion set to come from the European Regional Development Fund and the European Social Fund Plus.

How much of this is new money?

The European Green Deal Investment Plan builds on the Commission's proposal for the future long-term budget 2021-2027. Running for 7 years, it will mobilise 25% of the EU budget for climate financing and invest in environmental objectives through several EU programmes.

Extrapolated to 10 years, assuming the climate target will be at least maintained post -2027, the long-term budget is expected to deliver €503 billion. The next long-term budget 2021-2027 is currently under negotiation. The numbers are extrapolated to ten years, without prejudice to the

final agreement on the next long-term budget and the one after 2027.

The Plan also builds on the contributions from national budgets to EU projects, on public and private investments mobilised by InvestEU and the ETS funds

EU push compels Germany to act

In Germany, green investment is rising quickly in volume, but sustainable finance experts warn that the government needs to find a clear position on how it plans to integrate finance in its environmental policies in order to shape developments rather than just following them.

Though sustainable investment still only account for about 3 percent of the country's overall investment, the volume of assets managed in retail funds under the so-called ESG (environmental, social, governance) criteria in Germany has doubled over the past five years from €15 billion to over €30 billion. More coherent action, and pan-European coordination would be needed in the future, to help enact aspirations under the EU Green Deal. ■



India's top utilities seek extension to curb power plant emissions

Adani Power and NTPC, two of India's largest power producers, have pleaded to the government in Delhi to extend the deadlines of retrofitting coal power stations by two to three years. High costs for retrofits and India's continued reliance on cheap thermal coal now needs to be weighed up against rampant air pollution.

The latest push for a deadline extension, if granted, would push back India's emission targets for a second time. The government had already extended its initial December 2017 deadlines for electricity producers to meet tighter emission restrictions, bowing to pressure from the coal industry.

Pushing for further delays

Privately-held Adani Power, for once, calls for an extension of stricter emission limits at two of its large-scale power stations until March 2023. The two units were purchased from the GMR Group last year, and the Adani claims there would still be ownership issues to be resolved before looking into a plant retrofit.

State-owned NTPC, India's largest utility, has sought to push back the deadline by up to two years at its Bongaigaon eastern Indian plant.

Coal is by far India's dominant energy source, and the power sector accounts for two-thirds of India's coal consumption. Now policy makers and regulators in the second



largest economy in the Asia-Pacific region needs to decide on whether they want to stick to their green energy targets, or keep watering them down.

Opposing FGD tech for retrofits

In a letter to the regulator, Adani said: "It is requested to kindly extend the flue-gas desulphurisation (FGD) installation schedule

for Raikheeda thermal power plant of GMR Chattisgarh Energy to 31-March-2023." The FGD equipment is used to reduce emissions of gases known to cause lung diseases.

Small-scale power generators for industrial use, represented by the Indian captive power producers association, argue "the way FGD technology is being forced upon the industry is not practically sustainable." ■

RWE could get €2 billion in compensation for coal exit

Germany's second largest utility RWE could receive up to two billion Euros in compensation for closing its lignite power station under a coal exit agreement currently drawn up by the economy ministry. The Czech energy holding EPH, however, is asking for significantly more compensation for its power assets in eastern Germany than the government is willing to pay.

Compensation payments are currently planned for power plants with a total capacity of 2.5 gigawatts (GW) that will be turned off by the end of 2022. Additional payments of some 700 million Euros will be made to finance the early retirement of about 3,000 coal workers.

After months of talks, Germany's multi-stakeholder coal exit commission had agreed to phase out the fossil fuel by 2038 at the latest. Early on, RWE had signaled it could shoulder the early shutdowns in western Germany, due to its greater economic alternatives than in the East.

Quarrels about Datteln-4

Uniper, Germany's largest utility, had propose to shut down or convert to gas all its entire fleet of coal power stations in return for putting online its new hard-coal plant

Datteln-4 before summer 2020.

For power stations already built but not yet operation, such as Datteln-4, the German coal exit commission had initially recommended a negotiated solution so they are not taken into operation. However, Eastern German states, that are bound to be hard hit by the coal exit, find this ruling unfair and want the new Datteln power unit not to be put into operation.

Trying to resolve matters, Chancellor Angela Merkel has invited all coal-state government heads to a meeting in the chancellery on 15 January. ■



Rolls-Royce takes majority stake in German power storage firm Qinous

Rolls-Royce has purchased a 73.1 percent majority stake in Berlin-based electricity storage specialist Qinous for an unspecified price, effective from tomorrow, January 15. With this move, the British manufacturer wants to “pool all its microgrid activities” – from simple storage solutions to complex microgrid solutions of various sizes and configurations.

Qinous has made a name for itself with modular, scalable, prefabricated plug-and-play battery products that combine renewable energy sources, power generators and battery storage technology. The specialist for battery storage and associated control systems, and has already implemented storage solutions around the world.

“As a young, start-up-style company, Qinous brings expertise that is an ideal complement to Rolls-Royce's industrial credentials. Together we will be able to respond quickly and with great professionalism to the demands of the market,” said Andreas Schell, CEO of Rolls-Royce Power Systems. “In future, we will be able to offer not just the technical solution and associated service offerings, but the finance too.”

Response to rapidly growing microgrid market

The closer partnership is seen as a logical and consistent step towards opening up the rapidly growing microgrid market. “Functionality and reliability of our solutions have been proven. Now, with MTU's experience and global presence, we can meet demand more quickly and more comprehensively,” said Qinous co-founder Steffen Heinrich. He thanked the “seedcorn investors” who made it possible to set Qinous up as a company, and gave continuous support.

Rolls-Royce had already acquired a

19.9% stake in the former start-up back in October 2018. Now, it is boosting its shareholding to over 73 percent by snapping up the stakes of all other current financial investors, including that of investment holdings IBB Berlin. The founding shareholders will own part of the company and retain their current roles in the business.

The modular components of the Qinous/MTU product range will span from 30 kW/30kWh to several megawatts (MW). This covers the needs of commercial enterprises, municipal utilities, energy suppliers, and even sizeable industrial plants.

The two partner will offer microgrid solutions, based on various power gen and storage systems. According to Cordelia Thielitz, VP of Rolls-Royce's microgrid solutions business, “The key to this is the comprehensive expertise in storage technology, the efficient integration of microgrid components and the development of intelligent control systems.”

Berlin-based Qinous employs around 40 people. Rolls-Royce is engaged in research and development of microgrids and power generators at four locations: Friedrichshafen, Ruhstorf, Augsburg, all situated in Germany as well as at Mankato, Minnesota, U.S. ■



NEWS NUDGES

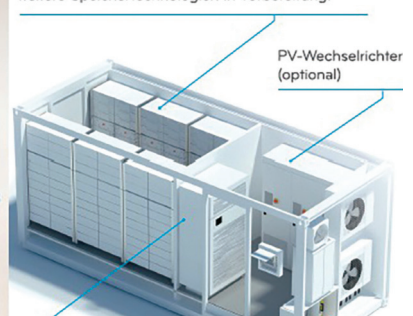
Caterpillar's new genset comply with UK & German grid codes

Caterpillar Inc. has launched a series of new generator sets that comply with the new G99 United Kingdom, VDE-AR-N 4110 German and Belgium C10/C11 grid codes. The following gensets – G3500H, CG132B, CG170, and CG260 (rated from 280-4,500kVA) – have been verified to be able to accommodate different reactive power modes, active power functions, and connection conditions for normal operation or re-connection after mains decoupling.

Transneft launches battery-based power supply for ILI tools

Transneft Diascan, the largest Russian inspection service provider for pipelines, has developed and put into operation a power supply system for in-line inspection (ILI) tools based on rechargeable batteries. Flaw detectors performing inspections of trunk oil pipelines, gas pipelines and oil product pipelines can now use the energy from rechargeable batteries, which helps save time and reduces the cost of in-line inspection. ■

Batteriesystem: Langlebige Lithium-Ionen-Batterie, weitere Speichertechnologien in Vorbereitung.



MHPS singles out its five best suppliers and business partners

Mitsubishi Hitachi Power Systems (MHPS) has presented its 2019 “Best Partner Awards” to supplier that made “especially noteworthy contributions” to its business last year. The five recipients are Kajima Corp. of Japan, the Dutch company HP Valves, Himile of China, South Korea's Sung Il Sim, and the Taiwanese engineering firm Liang Lian.

Himile Mechanical Science and Technology, based in China's Shandong Province, was singled out for its “ability to handle blanket orders for gas turbine components,” notably cast steel and castings as well as final machining and fitting of attachments, helping to strengthen MHPS' competitiveness.

Kajima supported MHPS to make revisions to construction work designs and

methods according to value engineering (note) principles. Sung Il continued its production of prefabricated piping processed at the factory and assembled on site, with “stable quality over many years.”

HP Valves, also known as Hengelo, helped expand scope of MHPS' business for high pressure valves for several projects including first-time customers, and completed delivery while maintaining quality and dead-

lines. Liang Lian Industries received an award for manufacturing a ship desulfurization scrubber (exhaust gas treatment system), conducted quality and delivery date management for the initial unit, and completed shipment on schedule.

Going forward, the MHPS said it will step up its efforts to improve quality, delivery speed, and cost in the areas of thermal power generation and environmental technologies. ■

Lumenion stores excess renewable energy in steel plates

Berlin-based energy startup Lumenion has presented the pilot of its 2.4-megawatt-hour (MWh) steel storage system in a housing project in the German capital. The technology allows storing excess renewable electricity in the form of heat (up to 650°C) in steel plates. If required, that stored heat can be converted back into electricity by means of a special turbine.

“Our steel storage technology enables clean energy to be used with a time lag – both as heat and as electricity,” said the company’s founder, Alexander Voigt.

Pilot plant integrated with Vattenfall CHP

In the pilot project in Berlin a 2.4 MWh steel block is being tested at Vattenfalls’ existing gas-fired cogeneration plant. The system will store peaks and feed them into the local heating network, when needed. Test operation will begin in early 2020, and normal operation will follow still in this heating period.

In a second step, developers want to test the re-conversion of stored heat to electricity.

To date, however, the Berlin pilot plant does not include a power generator because the re-conversion of stored heat into electricity is not profitable under Germany’s current regulatory framework. “We would normally only plan to do this with 50 MWh facilities or larger,” Lumenion explained.

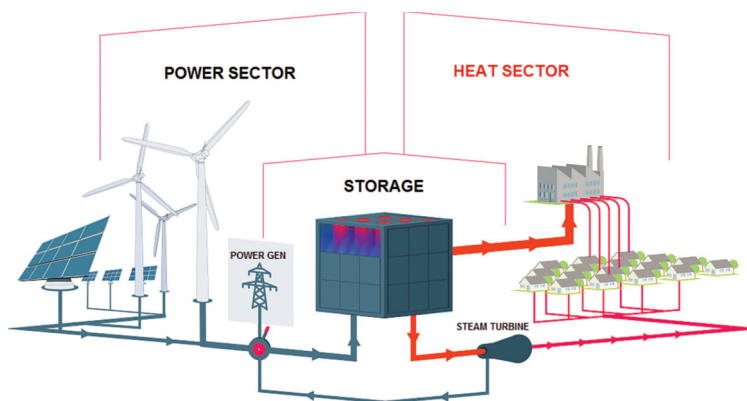
Aspiring to store over 1,400 MWh of green energy

Parallel to this pilot project, Lumenion is testing a 450 kWh prototype on the campus of the University of Applied Sciences (HTW) in Berlin. HTW supports Lumenion with practical accompanying research. As next milestones, Lumenion plans to install storage facilities with capacities of 40 MWh and even 1,400 MWh.

Germany’s rapidly rising share of weather-dependent renewable energy sources makes the country a testbed for various power storage technologies. The aim is to commercialize technologies that can economically store surplus energy from wind and solar power installation.

Various energy storage projects have sprung up across Germany, mainly in the form of batteries designed to help balance the regional power grid. This boom has

spawned a lively storage industry looking to commercialize viable technologies ready for export to global markets. ■



Lithium-ion batteries still dominate U.S. market, and beyond

Nearly all utility-scale battery systems installed in the United States over the past five years use lithium-ion technology, according to government findings. Provided all battery system additions will be completed as planned, and no capacity is retired, the total battery storage capacity in the U.S. could exceed 2,500 MW by 2023.

Li-ion batteries are known for their high-cycle efficiency, fast response times, and high energy density. Demand for lithium-ion batteries has been driven by the power generation and the electric vehicles sector, which has led to continued performance improvements and cost reductions for those batteries.

Moving from nickel to vanadium

“Nickel-based batteries tend to have higher energy densities but lower cycle lives,” EIA analysts commented. “Other battery chemistries, such as sodium and lead-acid, have been installed in a few applications, but these chemistries have not shown significant or sustained growth.”

Newer battery technologies – notably vanadium flow batteries – are being developed to achieve higher capacities, improve safety, and increase cycle life at lower costs. Two vanadium flow battery systems were installed in the U.S. in 2017 with a combined power capacity of 4.4 MW and 16 MWh energy capacity. ■



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Norway's Gassco transports Australian LNG equivalent output to Europe

Gassco, the Norwegian natural gas pipeline operator, has transported 106.99 billion cubic metres of gas from Norway to northern Europe and the UK in 2019 – just above the volume of Australian LNG exports in the same year.

Despite a small decline from 114.2 billion cubic metres in 2018, Gassco said the year 2019 ranked as one of the best ever for gas deliveries from the Norwegian continental shelf.

"Even in a year with a big rise in European imports of liquefied natural gas (LNG), Norway's gas deliveries were well above the average for the past decade," commented Gassco's CEO, Frode Leversund.

High and stable volumes of Norwegian

gas supply ensured stable deliveries to Europe. Gassco noted the availability for delivery of gas to the transport system over the past year was more than 99 percent. "That's a solid result," Leversund commented, "and demonstrates good interaction from field to delivery points in Europe."

By comparison, Gazprom's exports of Russian pipeline gas to Europe and Turkey reached almost 202 Bcm in 2018, according to the last available official figures.

Going forward, the Norwegian state-owned TSO Gassco is working to find the right integrated infrastructure solutions to enhance gas deliveries from the Norwegian continental shelf. Extensive planned maintenance work has already been carried out in 2019, and is bound to continue.

In addition to natural gas, Gassco noted its deliveries of natural gas liquids (NGL) and condensate from the process plants at Kårstø, Kollsnes and Nyhamna totalled 10.1 million tonnes in 2019. ■



Langeled receiving terminal at Easington on the English east coast.

TurkStream launch allows Gazprom transit-free gas supply to Turkey

Gazprom has just launched TurkStream, a two-string gas pipeline through the Black Sea to Turkey with a combined throughput capacity of 31.5 billion cubic meters (Bcm). The first string will deliver Russian gas to Turkey, while the second string is intended for gas transit to southeastern Europe.

Pipe-laying for TurkStream took 15 months and was completed ahead of schedule, Gazprom underlined. The interconnector is "unique from a technological standpoint," it stressed given that for the first time ever, a pipeline of 813 millimeters in diameter was laid at a depth of 2,200 meters.

The starting point of TurkStream is the Russkaya compressor station near the town of Anapa. With 224 MW capacity, it maintains the pressure required for transmitting gas along the pipeline's two strings through more than 930 kilometers up to the Turkish coast where gas enters the receiving terminal near the city of Kiyikoy.

"The launch of TurkStream is a history-making event. Taking into account exports via Blue Stream, we have paved the way for

direct transit-free supplies to fully meet Turkey's needs for Gazprom's gas. Europe now has a new and reliable route to receive Russian pipeline gas," said the chairman of the Gazprom Management Committee, Alexey Miller said at the opening ceremony

on Wednesday.

"Thanks to all of this, our cooperation with our Turkish and European partners is shifting to a new level," he said, suggesting "[it] is going to help improve energy security in the region." ■



Israel Electric orders second 9HA turbine from GE for Orot Rabin plant

Israel Electric Corporation (IEC) has awarded another order to GE to provide a second 9HA.01 gas turbine for the Orot Rabin modernization project. The aim is to convert parts of the 2.59 GW coal-fired power station at Hadera into Israel's largest combined-cycle gas turbine plant, delivering up to 1,260 MW.

IEC's modernization project for the Hadera plant, first announced in 2018, comes in reaction to new legislation passed by the government of Israel, notably the 2011 Clean Air Law.

For GE, today's order win comes shortly after the contract for the first HA turbine was signed in April 2019. As per the latest order, GE will also provide a steam turbine, generator, heat recovery steam generator and balance of plant equipment—as well as a 15-year services agreement.

First CCGT due operational in 2022

With over 61% net efficiency rate, each of GE's 9HA.01 gas-fired units will produce 630 MW to replace the output of four of the existing coal-fired units. The first unit of the converted Hadera CCGT plant is due for commissioning in 2022.



View of the Orot Rabin power station at Hadera, Israel.

Once fully operational, the Orot Rabin CCGT is expected to be largest and the most efficient gas-fired power unit in Israel. With an installed capacity of nearly 1.3 GW the CCGT will account for more than 8% of Israel's total installed power generation capacity.

"Gas will play a significant role in Israel's energy future due to its sustainability, generation flexibility, low capital costs, natural resource efficiency, and rapid deployment capabilities," said Michael Rechsteiner, CEO of GE's Gas Power business in Europe. The 9HA turbines are using natural gas as

the primary fuel and fuel oil as secondary fuel.

The fleet of GE's HA gas turbines recently reached the milestone of 500,000 operating hours, having secured 101 orders from 40+ customers across 19 countries. It is available for both 50 and 60 hertz markets. ■

Wärtsilä converts Brazilian power plant to run fully on natural gas

The Brazilian utility Rio Amazonas Energia (RAESA) has contracted Wärtsilä to convert the Cristiano Rocha power plant in Manaus to run fully on natural gas, while increasing output from 85 MW to 92 MW. This will reduce the plant's OPEX, and reduce emissions. Works are due completed in the first half of 2021.

Works will focus on converting the existing five Wärtsilä 46GD dual-fuel combustion engines to five Wärtsilä 50SG gas fueled engines, and additional system upgrades.

Once completed, the improved plant performance will raise its overall competitiveness, especially with regard to winning contracts in Brazil's future energy auctions. The operator RAESA seeks to extend its existing Power Purchase Agreement (PPA) to sell the entire power output from the Cristiano Rocha plant to the Brazil's national grid.

The current contract is set to expire in 2025.

No more need for rental power units

"The combination of converting to fully gas-powered operation and having a supporting long-term service agreement will deliver

clear economic, performance, and environmental benefits," said Edésio Nunes, CEO of Multiner. In his view, "this upgrade provides an avenue to transform our business to a more viable future enterprise."

At present, RAESA rents additional generators to ensure adequate output of the Cristiano Rocha power plant. The cost for rental power and more expensive diesel fuel will be eliminated when the conversion is completed.

Furthermore, the use of natural gas fuel will reduce the plant's carbon emissions by some 10 percent, representing some 35,000 metric tons of carbon dioxide equivalent per year, which equals the pollution from some 7600 cars.

According to Tom Lindqvist, responsible for service projects at Wärtsilä Energy, the conver-

sion and upgrade will increase the plant's operational reliability and diminish operating costs, while the service agreement will optimize equipment maintenance and planning, guarantee the capacity, and enable predictability of maintenance costs. "We shall have a dedicated technical consultant on hand at the plant to ensure that the capacity guarantees are met," he noted. ■



Cristiano Rocha power plant in Manaus

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