



Batteries and hydrogen electrolyzers 'ready for the big time'

Falling costs for lithium-ion batteries and hydrogen electrolyzers have rendered both technologies ready for mass commercialization. The International Energy Agency (IEA) projects the cost of 4-hour battery systems to fall to \$220/kWh by 2040, so utility-scale battery deployment could reach nearly 220 GW by 2040.

Stimulus-fuelled investment to rekindle economies after the corona crisis could help trigger a large-scale rollout of green energy sources and drive cost declines as the technologies progress. Both lithium-ion batteries and electrolyzers are at the stage in their development where wind and solar were in 2008-2009, the IEA executive director Fatih Birol said, suggesting "they have the potential to be the coming decade's breakout technologies."

Similar support schemes were once set up for wind and solar PV – "today both are cost-competitive in large parts of the global energy system in their own right," Dr. Birol noted. Offshore wind,

in particular, "is now ready for massive investment."

Wind turbines are based on mechanical engineering in which European countries, especially Germany, have a comparative advantage. But solar panels are an extension of semiconductor

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Uniper CEO says Nord Stream-2 could run on 80% hydrogen

Germany should not focus exclusively on 'green hydrogen', made with renewable electricity, but start decarbonising LNG pipeline gas as well, Uniper CEO Andreas Schierenbeck. The Nord Stream-2 pipeline could run on 80% hydrogen, he said to increase public acceptance for the project.

Construction of Nord Stream 2 is now 83% complete but progress has been halted after the U.S. government threatened to impose sanctions on the Swiss pipe laying firm Allseas. Gazprom, the majority owner of the pipeline, vowed to complete the remaining 100-mile stretch with a Russian pipe laying vessel.

Once completed, the Uniper CEO could accept a quota that prescribes that a certain amount of Nord Stream's throughput should be hydrogen. This measure would help transform wider north-



ern European gas network towards mixing natural gas with hydrogen of any kind.

Green vs. blue hydrogen

The German government aims for global leadership in hydrogen technologies, considered crucial

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electronics, an area where China already had a competitive edge.

Clean energy stimulus rekindles economy

Trying to revive the economy, governments around the world are cobbling together massive stimulus packages. These huge public spending programs will shape countries' infrastructure and energy systems for decades to come.

Time is of the essence, given that the pandemic has triggered the biggest economic collapse since the Great Depression. Hence, the IEA is urging national government to put clean energy jobs at the centre of stimulus packages.

Investing in energy efficiency also has large benefits for employment; previous stimulus plans in the United States and elsewhere supported large numbers of jobs by fuelling demand for the labour-intensive

work of upgrading building.

Electricity and internet networks are vital to keep professionals connected while working from home and help industries get through the current crisis. However, current grids are not ready for a more electrified future in which wind and solar account for a rising share of power generation, the IEA warned. Governments should hence help TSO to integrate smart digital technologies in their operation to enhance grid stability. ■

Europe's power generation may cause 20% fewer emissions in 2020

European carbon emissions from power production could fall by 15% to 20% this year amid faltering electricity demand due to the pandemic. In case of a slow recovery, the baseload power price in Germany could lie 30% below pre-crisis level this year, DNV GL analysis finds.

In a fast recovery scenario, German baseload power could still cost 21% less than before the coronavirus stifled the Europe's largest economy and pulled southern Europe on the brink of a recession.

Lockdowns of industries and much of the service sector throughout Europe have led to a steep drop in electricity demand, with energy-related carbon emission likely to drop by more than 100 million tonnes.

Earlier coal exit?

The fuel switch from coal to gas-fired power generation, which started before the crisis due to a high price on carbon and falling gas prices due to global oversupply, is bound to continue, DNV GL forecasts.

Earlier shutdowns of some coal power plants "could come into consideration in the event of a slow recovery of the global econ-

omy", analysts said, suggesting Germany might then have to import more electricity on a temporary basis.

Higher RES contribution

Renewable energy sources are covering a rising share of Germany's power demand, which fell off a cliff due to the health crisis. More than half of all electricity produced in

Germany came from renewable power sources, for the first time over an entire quarter during the first three months of 2020.

The intermittent nature of wind and solar power supply, combined with its growing contribution, has greatly increased the volatility of wholesale power prices, and occasionally causes negative prices.

Storing excess volumes of intermittent

wind and solar energy in batteries, or in the form of hydrogen via electrolysis, would help balance the grid. Investment in commercializing these technologies will be helped by a state stimulus package, designed to revive the economy in the aftermath of the pandemic. ■



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to make the economy carbon-neutral by 2050. However, the national hydrogen strat-

egy has been delayed due to disagreements on targets for making 'green hydrogen', and on the extent to which 'blue hydrogen' made from natural gas using carbon capture storage (CCS) should be used as a transitional technology.

Advocating the use of 'blue hydrogen', Eurogas Secretary General, James Watson, noted that the fuel is likely to replace natural gas in some parts of EU pipeline system. "Instead of transporting only natural gas, Nord Stream 2 could transport 80% of the hydrogen," he noted, pointing at the EU's ambitious decarbonization program.

The industry association BDI opposes ruling out the use of 'blue hydrogen', arguing that insisting on green hydrogen would

delay technology development given that sufficient volumes will not be available by 2030. The economy ministry's February draft of the German hydrogen strategy, seen by the Clean Energy Wire, said that while green hydrogen "is sustainable in the long term," blue hydrogen "will have to play a role for economic reasons to quickly establish the technology in the market and to decarbonise various areas of application."

Schierenbeck also said the strategy should include support for specific projects and some kind of national hydrogen market. "We will need both. For example, there is nothing to be said against prescribing that a certain amount of hydrogen is needed in the gas network, i.e. a quota." ■

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Coal-to-gas switch to push up South Korea's LNG imports

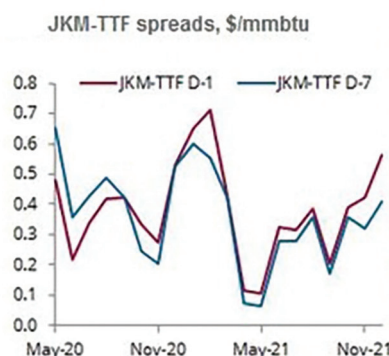
South Korean utility buyers prepare to switch fuel for power generation as oil-indexed LNG prices are becoming competitive with imported coal from Australia. Energy Aspects sees a potential demand upswing of Korean LNG imports of up to 2.6 million tons per month starting from July.

Lockdowns in Japan and India to contain the coronavirus have softened the JKM (Japan Korea Marker) near curve relative to prices at the Dutch TTF gas trading hub. The JKM-TTF spreads for summer delivery were last seen in the range of 0.22–0.53 \$/mmbtu, with the upper bound set by the freight differential for US cargoes delivering to Europe and Northeast Asia.

Japan sticks to coal

In Japan, analysts see fuel switching as less likely, given the low prices required. Forecasts for Brent oil prices for the remainder of 2020 are forecast are not low enough to support a Japanese power sector coal-to-gas fuel switch.

Japanese historic customs data suggest oil-indexed imports on a 14% slope against crude prices with a fixed premium of 0.8 \$/mmbtu. According to Energy Aspects, crude prices would need to average below \$23/bbl for oil-indexed LNG to be competitive against a coal-to-gas fuel-switch price of 4 \$/mmbtu – accounting for delivered coal prices and differences in generation



Source: CME, Energy Aspects

efficiencies for coal and gas.

Korea's coal tax pushes the balance to LNG

South Korea, in contrast, only needs oil-indexed prices to be below \$42/bbl for it to make state-owned supplier KOGAS's import prices low enough for a fuel switch. The higher fuel switch level is because thermal coal is taxed at a higher rate since April 2019 than natural gas when used for power generation.

Utilities' would start dispatching more gas-



fired power plants as soon as KOGAS translates these lower import costs into lower tariffs to these firms. Analysts note that KOGAS has little scope to absorb spot supply on top of existing commitments, with 29.6 Mtpa of supply under long-term contracts.

KOGAS's reported requests for delayed cargo deliveries over the coming months suggest that its higher y/y LNG inventories have left it with little ability to receive all its contracted supply. But Energy Aspects pointed out that "any fuel switch would not likely be in play until at least July."

Fuel economics in Europe hold firm in favour of gas as lockdowns ease

Regional power markets are recovering as lockdowns get gradually lifted in Spain and Germany but fuel economics clearly favour gas generation. Clean spark spreads are some €10-14/MWh higher than low efficiency dark spreads, and €4-9/MWh ahead of the most efficient hard coal-fired units.

Electricity demand is down between 5 and 10% across major markets in Europe but Wood Mackenzie analysts see "early signs of an up-turn" in Spain where lockdowns were lifted early. Denmark, Germany, Switzerland and Austria are also taking steps to end the lockdown as coronavirus infection rates start to fall.

EDF curtails nuclear output

Forward power prices, depressed due to demand destruction, rose last week in reaction to EDF's announcement that output from the French nuclear fleet will fall to 300 TWh in 2020, down from 380 TWh in 2019. EDF seems to "reserve the reactor fuel for winter 2020/21," analyst suggested. The lower nuclear output will limit the volume of electric-

ity France exports to its neighbours which is seen "offering potential relief to thermal generators."

Gas-fired power plants, in particular, could benefit from the lower dispatch of nuclear for baseload power supply. Thermal generation is kept running in several European markets to provide flexibility for the current high levels of renewable energy supply.



Grid edge technologies have come to the test as operators of both power plants and networks increasingly turn to remote diagnostics and operations as the pandemic is preventing onsite work.

Storage roll-out faces delays

Energy storage can also provide flexibility, but large projects are delayed as lockdowns have interrupted key supply chains. Wood Mackenzie anticipates the coronavirus could lower 2020 installations by 20% compared to the consultancy's 2020 base case.

The risk for distributed storage to be delayed, or even cancelled, is most acute, analysts noted. A return to pre-coronavirus impact levels is deemed unlikely before 2021.

Italy's economy, gas consumption show no signs of quick recovery

Recession is looming large in Italy, as the pandemic has harmed the country's economy and slashed energy demand. Gas-burn in the power sector fell 10% in the first quarter of 2020, and the Gas Exporting Countries Secretariat (GEFC) sees a sharp decline in imports, notably of U.S. LNG.

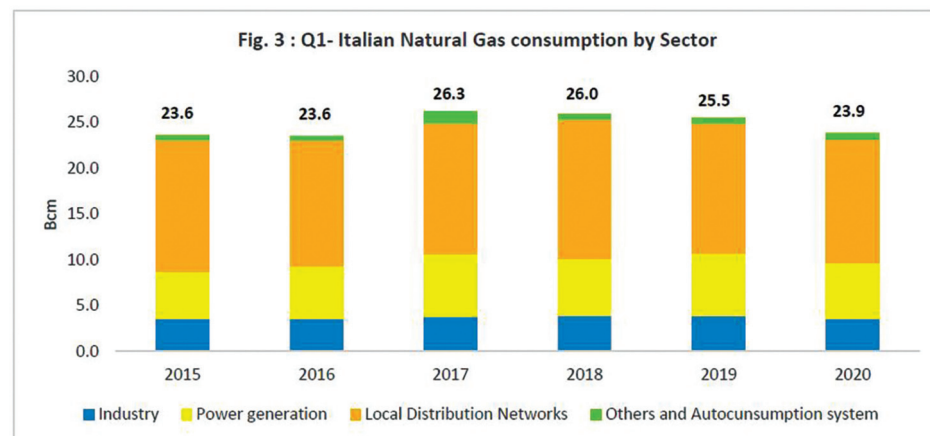
Lockdowns to contain the coronavirus caused a 6.5% drop in Italy's overall gas consumption in January through March, dragged down by a 10% drop in gas-burn for power generation and an 8.8% fall in industrial gas consumption.

For 2020, Italian demand will not recover to pre-year levels, the GEFC's head of gas market analysis Mahdjouba Belaifa commented. Demand is unlikely to exceed 70 Bcm, he forecast, as aftershock effects continue to threaten the economic recovery this year. Milder weather than expected also slows the pace of gas demand recovery, despite continuously falling gas and LNG prices in Europe.

Energy demand fell off a cliff

Industrial gas demand fell sharply in Italy following the March 12 lockdown to just 20 million cubic meters per day (mcm/d), compared to an average consumption of 71 mcm/d on March 10 and 11. In the power sector, gas consumption declined from 47 mcm/d before the lockdown to around 36 mcm/d by the end of March, a drop of 24%.

The sharp drop reverses a trend of rising gas consumption in the previous years when Italian utilities and industries took advantage of record low gas prices as oversupply keeps building up on global markets. In 2019, Italy's overall gas consumption



Source GEFC, SNAM

expanded by 1.7 Bcm, or 2.3%, to reach a total of 73.8 Bcm.

Gas-burn for power generation increased by 10%, more than offsetting the drop in gas consumption in the residential (-2%) and industrial sector (-1.8%), figures by the Italian network operator SNAM Rete Gas show.

US LNG imports now "uneconomic"

As Europe's third largest gas markets, Italy's imports are characterized by long-term gas supply contracts and some minor volumes of spot LNG. In recent years, imports originated mostly from Russia (42.1%), Algeria (17.9%), Libya (8.1%), Netherland and Norway (15.7%) and Qatar (11.2%).

Imports in 2019 increased 4.8% year-on-year as utility buyers and industry took advantage of the positive spread between prices at the Dutch trading hub TTF and the Italian PSV, resulting in higher gas flows via the northern interconnector at Passo Gries. Spot LNG shipments to Italy were also on the rise following a global production glut that turned Europe into a market of last resort.

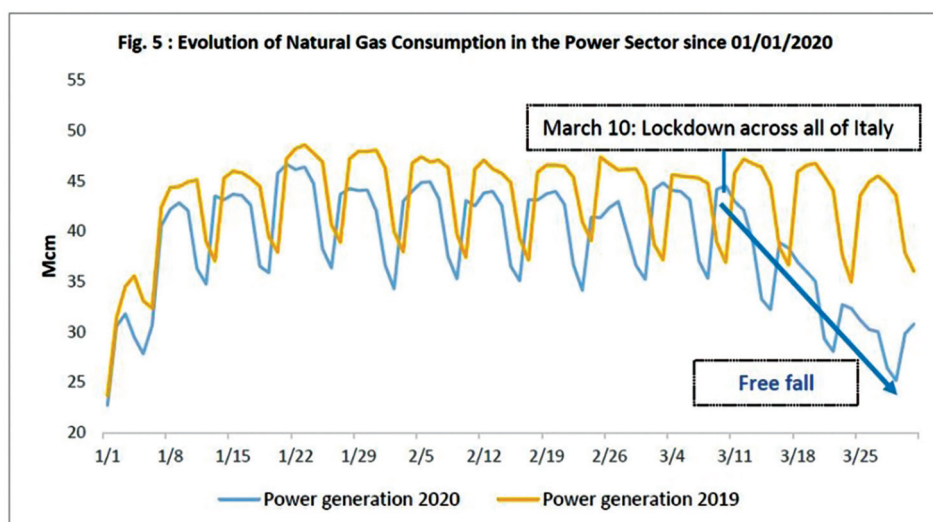
In 2020, however, demand destruction due to the pandemic is expected to challenge imports of US LNG which used to account for 3.55 mpta, or 5% of Italy's natural gas imports. The Doha-headquartered GEFC says at today's record low gas prices "it becomes uneconomic for US producers to export LNG to Europe and to Italy in particular."

A probable recession would harm imports, with any demand recovery largely depending on when the coronavirus will be contained. For the remainder of this year, GEFC senior gas market analyst Rafik Amara does not see Italian gas consumption recover to more than 2016-levels, as imports post the pandemic "will not peak significantly."

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A probable recession would harm imports, with any demand recovery largely depending on when the coronavirus will be contained.

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Source GEFC, SNAM

Wärtsilä's order intake down 12% amid coronavirus-related delays

Wärtsilä's first quarter net sales and earnings have been "materially impacted" by the pandemic. Energy equipment deliveries declined due to project timing and coronavirus-related delays, CEO Jaakko Eskola said. Order intake fell 12% to €1,247 million, almost halving the operating result to €56 million.

The marine and energy markets in which Wärtsilä operates are being affected by the lockdowns to contain the global pandemic. Uncertainty abounds about the financial impact of these measures hence the Finnish manufacturer withdrew its market outlook for 2020.

The steep fall in order intake resulted in a lower orderbook for the January to March period, down 5% at €5,745 million. Though net sales increased by 2% to €1,170 million, the operating result fell to €56 million, down from €102 million in Q1-2019, which represents 4.8% of net sales.

"During the first quarter of 2020, our business environment was characterised by a sudden increase in uncertainty related to the coronavirus pandemic and its longer-term impact on the global economy. Net sales increased slightly from the corresponding period last year, thanks to growth in both equipment deliveries and service activity in the Marine Business," the Wärtsilä CEO said.

"Energy equipment deliveries, on the other hand, declined largely due to project timing and some COVID-19 related delays

[given that] factories running at lower than usual capacity and in restricted mobility of field service personnel," he added.

Wärtsilä's operating result was consequently impacted by weaker fixed cost absorption, slower delivery of projects and service sales which are affected by cost overruns.

Demand still "reasonable"

Demand in the first quarter was "reasonable, considering the prevailing market conditions," Mr. Eskola said. Equipment order intake in the Energy Business improved, thanks to the turnkey contracts received for two large power plants in Latin America.

The effects of the pandemic have severely affected Wärtsilä's cruise segment,

while several energy project sites have been demobilised. The risk of a global recession has prompted shipowners and operators to re-evaluate their investment plans. Similarly, in the energy markets, deteriorating macroeconomic conditions and the anticipated decrease in electricity consumption are resulting in postponed investment decisions for new power generation capacity.

Cutting labour costs

To mitigate the weakened demand outlook, combined with lower project delivery, Wärtsilä has taken proactive steps to lower our cost base with approximately EUR 100 million. These cost cuts were achieved by reducing working hours and initiating temporary layoffs, as well as by limiting the use of external personnel and consultants.

The first concrete actions have already been taken in locations where operations have been adversely impacted by the pandemic, Wärtsilä said without specifying.

Looking ahead, Wärtsilä will reduce discretionary spending but will keep investing in R&D projects on alternative fuels for the shipping and energy sector. Advances have been made testing the use of ammonia in our engines and fuel systems, backed by Finish government funding for the X-Ahead project, aimed at developing the technical and business potential of Power-to-X. ■



Enagás net profits up 15% despite demand slump in March

The Spanish TSO Enagás has reported a 15% rise in net profits despite a slump in demand during the last two weeks of March due to lockdowns. However, gas demand over the full first quarter fell by just 2.4%, allowing Enagás to increase gross earnings to €235.6 million.

Adverse effects on Enagás sales and earnings become more visible when April figures are considered as well. "So far this year, total demand through April 20 decreased by 5.8% compared with the same period last year," the Spanish gas grid operator said.

Lower gas-burn for power gen

"This drop was the result of a fall in gas consumption by industry and business customers since the State of Emergency was established in Spain for the pandemic, while there was lower demand for electricity generation," it explained.

Enagás' earnings through March 31 reached €235.6 million, up 2.5% from

€229.9 million in the previous quarter. The Madrid-based company achieved a profit after tax of €119.1 million, up 14.9%.

Keeping LNG flowing

The positive results, in the face of the corona crisis, were achieved by enacting special working measures to keep LNG flowing at Enagás' three main regasification terminals. "We launched a Coronavirus Contingency Plan and the Spanish Gas System operated normally," stated Enagás.

"In the three main regas plants in Spain, in Barcelona, Cartagena and Huelva, a special work system was established that included the confinement of two operator shifts for 15 days," company explained. "In

addition, the shifts were working in parallel with two control centres for greater security,"

The Spanish TSO has four domestic import terminals around Spain also operates the Gijón LNG regas plant in the northwest and owns a 50% stake in the facility serving the city of Bilbao. ■



Enagás LNG import terminal in Barcelona

Lockdowns accelerate the transition of EU electricity system

European responses to contain the coronavirus accelerate the electricity system transition by a decade, Wärtsilä analysis finds. Coal generation collapsed by almost one third in the four weeks prior to April 10 while renewables contributed half of the reduced EU electricity demand, down by one tenth due to the lockdowns.

In the first three months of 2020, Coal-fired power generation fell by over a quarter across the EU and the UK compared to the same period in 2019, while renewable energy reached a 43% share. The stark rise in intermittent wind and solar power in-feed to the grid, combined with lower load factors, makes grid balancing increasingly difficult.

The figures mark a dramatic shift in Europe's energy mix – one that was not antic-

ipated to occur until the end of the decade. The pandemic has effectively accelerated the energy transition in key European economies, providing a unique opportunity to see how energy systems function with far higher levels of renewables.

- In the UK, renewables now have a 43% share of overall generation (up 10% on the same 10 March to 10 April period in 2019) with coal power down 35% and gas down 24%.

- Germany has seen the renewables contribution reach 60% (up 12%) and coal generation fall 44%, resulting in a fall in the carbon intensity of its electricity of nearly one third.
- Spain currently has 49% renewables with coal power down by 41%, while Italy has seen the steepest fall in demand, down 21% so far.

The impact of pandemic on the European energy system is "extraordinary," said Wärtsilä's VP for Europe & Africa, Björn Ullbro. "We are seeing levels of renewable electricity that some people believed would cause systems to collapse, yet they haven't – in fact they are coping well."

These figures come from the Wärtsilä Energy Transition Lab, a new free-to-use data platform developed by Wärtsilä to help understand the impact of the corona crisis. The platform provides data on electricity generation, demand and pricing for all 27 EU countries and the UK, combining Entso-E data in a single platform. It allows users to model how systems could operate in future with higher renewables, helping pinpoint problem areas and highlight where to focus policy and investment.

COVID-19 IMPACT ON THE EUROPEAN ELECTRICITY MARKET



Figures for the period 10 March to 10 April 2020 compared to 10 March to 10 April 2019.
Source: Wärtsilä Energy Transition Lab

Stimulus plan in Germany aimed at climate-friendly economic recovery

Green stimulus packages, fiercely debated in Germany, could be instrumental to reset the economy on a more climate-friendly path as the country gradually phases out both nuclear and coal power. However, calls from the industry to loosen emission regulations to boost economic activity are growing louder.

German federal states and utilities are urging state energy ministers in a position paper to expand Germany's power grid and renewable energies as part of an economic stimulus package. The aim is to speed up investments in hybrid power sources, energy storage and hydrogen – much of which would have become necessary anyway over the course of the next decade anyway.

Delay for national CO2 price on transport?

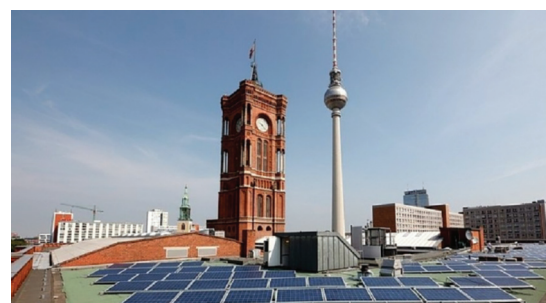
Several states want to put climate policy on the back burner, arguing that projects like the Green Deal would pose additional obstacles to economic recovery. Likewise, industry associations have said tighter environmental standards could hinder their ability to react to the coronavirus crisis, calling for some

stringent rules to be relaxed.

The pro-business party FDP questioned the introduction of a national price on carbon emissions in heating and transport, and some conservatives call for suspending the aviation tax planned in Germany's Climate Action Programme for at least one year.

Merkel remains firm on climate targets

German Chancellor Angela Merkel, in contrast, remains committed to climate action. She stressed "this issue has not gone away during the pandemic." Finance minister Olaf Scholz said a stimulus package oriented toward international climate targets and Germany's goal of becoming carbon neutral by 2050 would "make sense," as soon as the most pressing phase of the pandemic has ended.



A mass roll-out of solar PV could help resuscitate economic activity across Germany

Proposals include clean energy tax credits, requirements that bailed-out industries like airlines commit to emissions cuts, and investments in green infrastructure. This approach could both ensure that climate action is not neglected during the crisis, and help Germany stay competitive in energy transition technologies, a sector that could be worth about 23 trillion dollars by 2030, according to the World Bank.

Cricket Valley Power Plant (1.1 GW) starts up in New York State

Swiss developer Advanced Power, together with JERA Americas, has started commercial operation at the Cricket Valley Power Plant in Dover, southern New York state. The 1,100 MW combined-cycle plant, built by Bechtel, is powered by GE 7FA gas turbines.

Once in full swing, the flexible CCGT will be used to back up intermittent supply from wind and solar power units. Operational flexibility was a key focus of New York regulators, who required the plant operators to upgrade the nearby power grid and substations to allow for swift electricity in-feed for balancing purposes.

Construction works for the Cricket Valley CCGT began in January 2017, led by Bechtel as the engineering, procurement and construction (EPC) contractor on the project.

Powered by GE's 7FA gas turbines, the power plant will provide more cost-effective electricity with lower emissions than many existing plants in the downstate region of New York. The flexible CCGT will mostly pro-

vide electricity to a supply-constrained lower Hudson Valley and New York City markets.

Cricket Valley Energy Center LLC, part of Advanced Power, developed the project at an estimated cost of \$1.58 billion. JERA Americas is the largest investor on the project next to Idemitsu Kosan, Nuveen, Black Rock, Development Bank of Japan (DBJ), NongHyup Financial Group (NHFG), and Kiwoom.

Advanced Power has ample experience in acquiring or building and operating power generation assets throughout Europe and North America, including the 700-MW Carroll County CCGT in Ohio. The Swiss-based company has developed a total of 15,000 MW of power generation capacity, and subsequently closed \$7 billion of limited recourse project financing. ■



NEWS NUDGES

First Turbophase H-25 upgrade

Installation of the first Turbophase system on a Hitachi H25 gas turbine nears completion. The pilot project was carried out by the U.S. manufacturer PowerPHASE on a H25 turbine-driven cogeneration plant at a petrochemical factory in Pakistan. The retrofit boosts energy and steam supply for the petchem processes.

Finland frees up €1m for Power-to-X

Business Finland, a state-run agency for research funding, has granted Wärtsilä support of 1 million Euros to develop the technical and business potential of Power-to-X. The aim is to utilise renewable electricity, CO2 and hydrogen to create carbon-neutral and renewable synthetic fuels

Germans embrace solar plus battery storage

Sales for stationary battery storage have picked up substantially in Germany, with most systems purchased as part of photovoltaic solar systems for homes. Over 125,000 home storage systems (HSS) have been installed in Germany, with a combined battery capacity of 930 MWh which is roughly equivalent to a medium-sized pumped storage plant. Large-scale energy storage for grid stabilization, meanwhile, tops 60 units with a combined capacity of 550 MWh. ■

MHPS to convert Datan Unit 7 to combined-cycle mode by 2023

Mitsubishi Hitachi Power Systems (MHPS) has received an order to supply and install a steam turbine at the Datan Power Plant in Taiwan by 2023. The retrofit will convert Unit 7 from simple-cycle to combined-cycle mode and increase output from 600 MW to over 900 MW.

Situated in Taoyuan, some 50 kilometers west of Taipei, the Datan Power Plant consists of seven power units, all supplied by MHPS. Unit 1-6 already run in combined-cycle mode, generating a combined output of 4,200 MW.

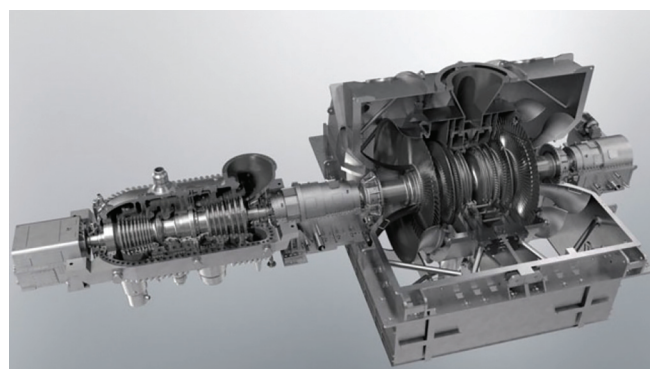
Unit 7, the focus of this project, is comprised of two simple cycle gas turbines supplied by other company, and began operations in 2018. The operator of the entire plant is Taiwan Power Company (TPC)

The conversion will be jointly carried out by MHPS and Mitsubishi, with the former set to supply one steam turbine and one electric power generator, along with auxiliary equip-

ment and spare parts. The steam turbine and electric power generator will be manufactured at MHPS' Hitachi Works in Hitachi, Ibaraki Prefecture, Japan.

State-owned TPC manages 75% of the total electricity generation in Taiwan and is seeking to expand its capacity further. In this context, MHP has already built the 2,600 MW Tunghsiao Power Plant in Miaoli County and is now working on various gas combined-

cycle conversions to enhance operational flexibility and increase output. ■



MHPS steam turbine, as used for the Datan upgrade

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