



Hurricane risk and elevated coal stocks could lower Henry Hub prices

Looming hurricanes, a seasonal drop in temperatures and higher-than-normal coal stocks pose a downside risk to gas prices at the U.S. Henry Hub. Hot August weather had briefly pushed up prices above \$3/MMBtu but elevated stockpiles and much lower prices for coal could reduce the share of gas in thermal power generation, Energy Aspects reckons.

Eastern coal prices are currently trading around \$50 per ton, down from nearly \$70/t in April, but analysts still anticipate the share of gas and coal generation to average 69.5% across September and October. This would be below the 73% recorded in the April to May period.

Falling temperatures in the autumn normally tends to reduce the need to dispatch coal peaking plants as so-called out-of-merit generation. This year, however, coal-burn may well increase markedly if utilities need to manage their elevated stockpiles before the winter begins, but analysts believe some cuts in coal production will take place in the second quarter of this year to help reduce the current oversupply. Energy Aspects show coal inventories have peaked



in June, but levels in November are likely to "fall just shy of this summer's high."

Meteorologists predict up to five major hurricanes

Higher sea surface temperature made meteorologists at the U.S. National Hurricane Center anticipate six to eleven hurricanes to form this season, with up to five potentially developing into major

continued on page 2

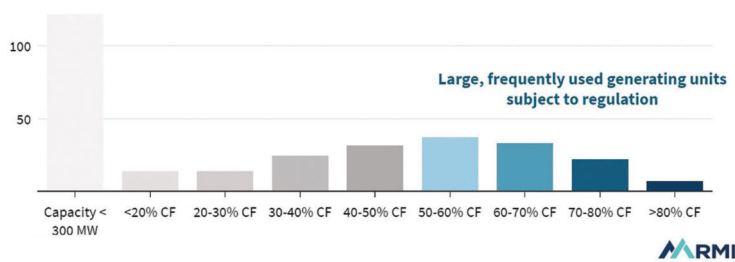
Most U.S. utilities can meet EPA standards with 'minor changes'

New emission standards proposed by the U.S. Environmental Protection Agency (EPA), can be met by most power plant operators, the Rocky Mountain Institute finds. Nearly 80% of America's 470 GW installed gas-fuelled capacity would be "not impacted" because they are either too small or dispatched too seldom – others will have to run less or invest to cut emissions.

Comments on the EPA's proposed standards show that the industry is fractured. Some utilities and grid operators raised concerns that the gas standards, in particular, could impact grid reliability by chilling the market for new gas-fired plants and limiting the ability of the existing fleet to generate electricity when needed. But analysis by the Rocky Mountain Institute shows that the standards provide "significant flexibility for gas plants to continue to operate" and that, in fact, most plants are not impacted.

Impacts of proposed EPA regulations on existing gas capacity, in aggregate.

Bars represent capacity, in MW. A majority of natural gas combustion turbines (including combined cycle units) are either smaller than 300 MW or operate at <50% capacity factor (CF).



Large and frequently run units most affected

Under the EPA's proposal, new gas-fired plants than run with a capacity greater than 20% need to reduce emission by either blending gas with

continued on page 2

AGENDA

FUEL MIX

Gas-burn in Florida's power mix more than doubles to 75% share

2

INVESTMENT

NOCs in Southeast Asia could spend \$119 billion on clean energy by 2027

3

Private equity power plants in PJM at risk of lower capital revenue

3

HYDROGEN

Delivery times for H2-projects can be reduced by 40%, Worley finds

5

TECHNOLOGY

F-DLC coating for steam condensers boost power plant efficiency by 2%

6

PROJECTS

JERA's re-powered 1.5 GW Futtsu-Group 4 starts commercial operation

7

Continued from page 1, top story

hurricanes. Overall, NOAA is calculating with a 60% chance of an above-normal hurricane season.

Tropical Storm Harold made landfall on August 22 in South Texas, primarily as a rain event – but observers stay on high alert given that hurricanes can severely impact LNG feedgas, industrial and power demand. Energy Aspect's balances include a 0.3 billion cubic feet per day (bcf/d) weather im-

pact from September to October, though analysts cautioned that figure comes with "significant uncertainty."

Heatwave lowered LNG feedgas volumes

The heatwave in South Central U.S. over July-August had limited the utilisation of LNG export capacity along the U.S. Gulf Coast, with modelling showing LNG feedgas

volumes 0.3 bcf/d lower over the past two months.

Maintenance at Sabine Pass reduced the liquefaction plant's capacity utilisation to 85% from June to August and further disruptions lie ahead as Cheniere will carry out maintenance on the Creole Trail Pipeline's Gillis compressor on 30–31 August and 5–6 September, reducing flows on the pipeline by 0.23 bcf/d and 0.53 bcf/d, respectively. ■

Gas-burn in Florida's power mix more than doubles to 75% share

Florida's generating mix has become less divers over the past 20 years as the share of natural gas increased from 31% of the state's electricity output to 75% by the end of last year. Installation of 26.8 GW of new and advanced gas-fired capacity supported this growth and supply of the low-priced fuel through the expanded Southeast U.S. pipeline network.

The surge in gas-fuelled power generation capacity came about as older, less-efficient coal-fired generators retired. Some 4.2 GW of coal-fired capacity has been taken offline since 2002 – a loss of 48% in coal capacity which lowered the contribution of coal from 33% to currently just 6% of Florida's energy mix.

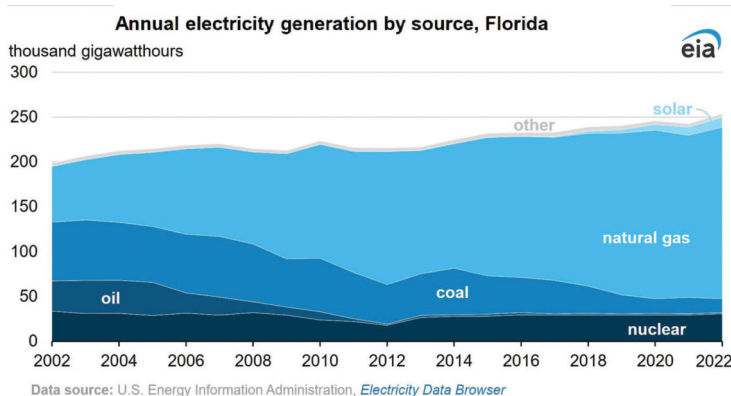
Oil-fired generation fell off a cliff as 80%, or 5.9 GW of installed capacity was retired over the past twenty years reducing the fuel's share from 17% to under 1%. Solar power, in contrast, staged a stark increase: The first utility-scale solar power projects in Florida started operating in 2009, and total capacity grew to 5.9 GW by the end of 2022. Nuclear keeps supplying about 13%

of electricity in the Sunshine State.

Looking ahead, government analysts expect a continuous change in Florida's generation mix through to 2026. Announced natural gas capacity additions during this period total 1.8 GW, while solar capacity is planned to double to 11.6 GW, or 5.5 GW of new units during this period.

Meanwhile, announced coal retirements total 1 GW through 2026,

which will decrease current operating coal-fired capacity to 3.5 GW and spark a rise in solar and gas power gen, complemented by energy storage. ■



Continued from page 1

hydrogen (30% by 2032, then 96% by 2038), or install carbon capture technology by 2035. For existing gas-fired plants, the same emission rates and timelines are required but analysts pointed out the standards only apply frequently run units: those that have an annual capacity factor greater than 50% and are larger than 300 MW.

Considering the 470 GW of existing capacity based on gas combustion turbines or combined-cycle power plants, nearly 80% of units are "not impacted," analysts noted, because they fall below the 300 MW size limit or are already dispatched less than 50%.

Of the remaining units that are subject to the EPA's proposed standards, many run near the 50% threshold and could comply with "only minor changes in annual operation," analyst suggested. That leaves just a small fraction, 6% of units, which would likely have to lower their capacity factor by more than 20% or invest in emissions reduction technology by 2032 or 2035.

Changes to how fleets operate

Though many U.S. utilities may first appear to be hard hit based on size and factor thresholds, the Rocky Mountain Institute finds many would be able to meet standards with minor changes in operation.

For example, 46% of gas capacity owned by Florida Power & Light Co. currently meets criteria of "large and frequently used," but 97% of capacity could fall below the criteria for additional emissions reduction if plants between 50–70% capacity factor reduce operations to below a 50% capacity factor, analysts noted. "The remaining 3% of gas capacity for Florida Power & Light will indeed need to operate much differently than it currently does," analyst conceded — or to be modified with hydrogen or CCS technology by 2032.

There will also likely be significant changes to how the fleet operates — including a reduction in capacity factors — before 2032, as investment in clean energy accelerates. ■

Gas to Power Journal

Publisher
Stuart Fryer

Editor
Anja Karl
Tel: +44 (0)7733 684 682
anja@gastopowerjournal.com

Advertising
David Jeffries
Tel: +44 (0)7973 642 086
djeffries@lngjournal.com

New Business & Databases
Stephan Venter
Tel: +44 (0) 207 017 3407
venter@gastopowerjournal.com

Subscriptions
Margarita Tokere
Tel: +33 (0)7 67 62 58 77
margarita@gastopowerjournal.com

Layout & Production
Vivian Chee
Tel: +44 (0) 208 995 5540
chee@btconnect.com

NOCs in Southeast Asia could spend \$119 billion on clean energy by 2027

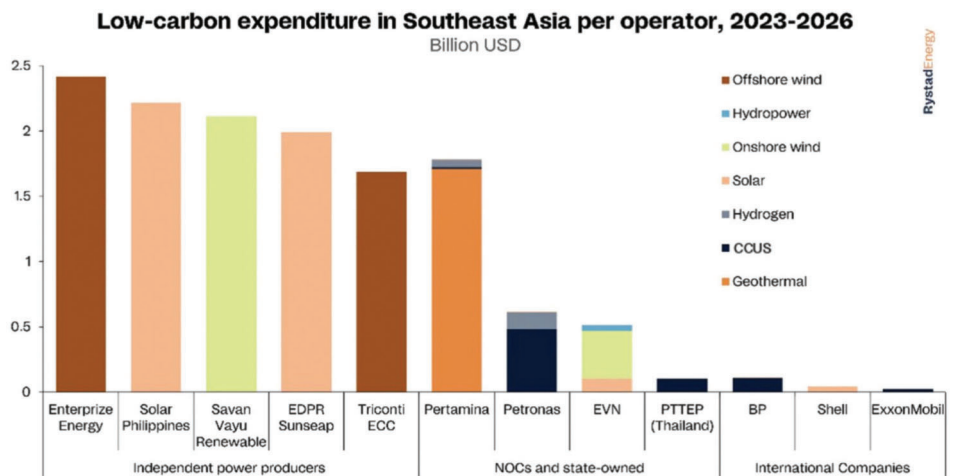
Southeast Asian national oil companies (NOCs) are expected to invest more than \$76 billion in clean energy initiatives by 2025 and potentially \$119 billion by the end of 2027. Malaysia's Petronas plans to build the world's largest capture, carbon, utilization and storage (CCUS) facility by 2025, while Indonesia's Pertamina ventures into geothermal, wind and solar to diversify its business.

Analysts cautioned Southeast Asia has been slow at developing clean energy projects, hence an effective collaboration between private and public sectors is seen as crucial to the region's transition to sustainable energy. Global majors are dragging their feet: "Shell and ExxonMobil are displaying interest in Southeast Asian low low-carbon prospects, but their immediate investments have primarily focused on Europe and North America," analysts at Rystad Energy commented.

Courting western partners

Petronas is seeking to partner with international companies with the aim of capturing 3.3 million tons per annum of CO₂ and store it in the oil and gas reservoirs of the Sarawak over its 25-year operational lifespan. Though project costs were not disclosed, Rystad estimates they could reach \$260 million by 2025. The Malaysian NOC vowed it will spend \$450 million on CCUS projects and \$330 million on hydrogen developments through 2026, without specifying.

Pertamina Geothermal Energy, part of the Indonesian NOC, is dedicated to spent about \$1.6 billion between this year and 2026 on expanding its geothermal projects. Similarly, PetroVietnam is working with Danish company Orsted and T&T Group to



Source: Rystad Energy's Service Market Solution, August 2022
A Rystad Energy graphic

launch the country's first offshore wind projects. The project aims to generate about 13,665,600 MWh annually, utilizing 20-MW turbines. The estimated investment in the project is between \$11.9 and \$13.6 billion.

Embracing a dual strategy

Service providers in the oil & gas sector, meanwhile, have adopted a dual strategy by capitalising on the immediate demand for hydrocarbon well services while participating in low-carbon ventures. This backing is crucial if as policy makers in the region want to boost the share of renewable energy in the power generation mix to at least 30% by 2040.

Transition effort differ across countries. Vietnam's Power Development Plan VIII is focussed on reducing reliance on fossil fuels by expanding onshore and offshore wind capacity. Taking a broader approach, the Philippines is courting foreign investment in solar, wind and energy storage projects. Indonesia, meanwhile, is offering fiscal incentives to catalyse investments in geothermal, CCUS, solar and wind.

Local companies, however, may face limitations in expanding into renewables, especially in terms of working capital and expertise, analysts caution. Attracting third-party investments is hence deemed crucial for getting projects off the ground.

Private equity power plants in PJM at risk of lower capital revenue

ArcLight, LS Power and Talen Energy are at risk of reaping a lower capital revenue for their private-capital funded power plants in PJM, the largest power market in the United States. According to IEEFA figures, capacity payments collapsed from around \$115 /MW-day in the 2011s to less than \$40/MW-day in the last three region-wide auctions.

Nearly 29 GW of fast-start, combined-cycle gas power plant in PJM has been private-capital funded since over the past fifteen years – more than 80% of the total installed capacity. Private capital now owns about 60% of fossil-fuelled power gen capacity in PJM, a build-out once profitable for developers but increasingly less so.

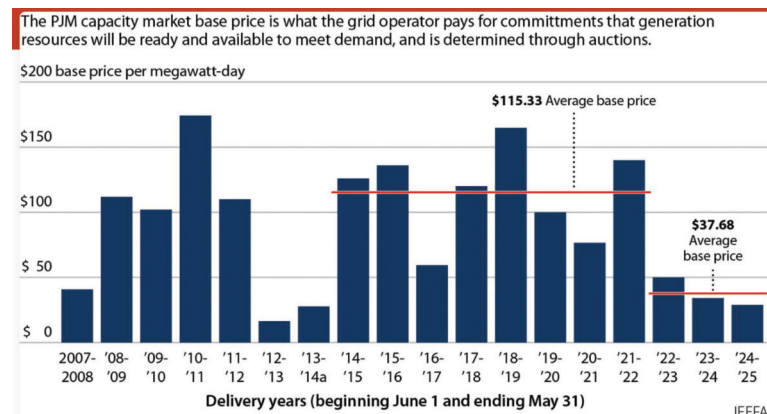
IEEFA, the Institute for Energy Economics and Financial Analysis, anticipate a "much riskier future" for private equity and private capital in PJM which contrasts with the previous strong, steady growth. Capacity market reforms lowered guaranteed returns while additions of renewable energy and battery storage projects reduce the

need to dispatch gas-fuelled peaking plants.

"The sharp drop in capacity payments for operators to make do with less while devel-

opers are hard pressed to convince lenders that their plans are still worth the risk," said Dennis Wamsted, IEEFA energy analyst.

"Bankers considering a project now know full well that non-performance will be costly, potentially prompting them to raise their financing costs for new gas-fired projects," he warned.



MAN Energy Solutions
Future in the making



Moving big things to zero

**with carbon capture & storage
to approach climate neutrality**

We're transforming CO₂

Heavy industries like cement, steel, and chemicals are some of the hardest to decarbonize. We offer carbon capture and processing as a solution to prevent CO₂ from entering the atmosphere. Our technologies support the extraction, compression, and liquefaction of CO₂. Carbon capture not only reduces your emissions, it also saves carbon taxes, and can open business opportunities for turning waste into a valuable commodity.

www.man-es.com

Delivery times for H2-projects can be reduced by 40%, Worley finds

Worley and researchers at Princeton University warn traditional delivery methods are “simply too slow” to realise the EU’s goal of producing 10 million tons per annum (mtpa) of renewable hydrogen by 2030. They hence devised a ten-point plan to accelerate delivery by 40%, given that 25 projects at a scale of 3 GW need to be onstream by 2030 to meet the EU’s target.

Ambitious green energy goals, set out by the European Commissions, would require an eight-to-12-fold increase in global electrolyser manufacturing capacity, four-fold increase in offshore wind power build-out every year, and 35% more desalination capacity additions before the end of the decade. A daunting, if not impossible task.

According to a Worley and Princeton report, 25 projects at a scale of 3 GW electrolyser and 400 kilo-tonnes per annum (ktpa) need to reach commercial operation date by 2030 to meet the EU’s target. The timeline required to deliver these projects is likely to be a minimum of 8 years, though timelines beyond 10-years are probable – hence a change of approach is needed to bring the goal back within reach.

Collaboration drives investment

Applying a “new radical delivery paradigm,” researchers set out the ‘EU Renewable H2 Initiative Plan’ with clear and actionable recommendations. Proposed initiatives include government underwriting of demand and streamlining permitting, the use of standardisation within the hydrogen industry, and widespread sharing of best practice.

“This new level of collaboration and support will be essential for driving investment faster, steering the region towards both sustainable and environmentally conscious

energy production,” said Dr Paul Ebert, Group Director Sustainability Leadership from Worley.

Today, in contrast, knowledge and expertise are often held in-house to maintain

commercial advantages. The whitepaper hence outlines “pragmatic steps for participants in the clean energy chain,” Ebert said, urging them to build momentum towards the critical decades of 2030 and 2040s. ■

Fuel cell generator market could expand to \$2.1 billion by 2030

Data centres’ rising demand for reliable power are escalating growth for fuel cell generators, with the market forecast to surge from its current valuation of \$0.5 billion to \$2.1 billion by 2030 at an extraordinary annual growth rate of 25.4%. Hydrogen-powered fuel cells account for the largest market share as they have quick refuelling times and a high-power density.

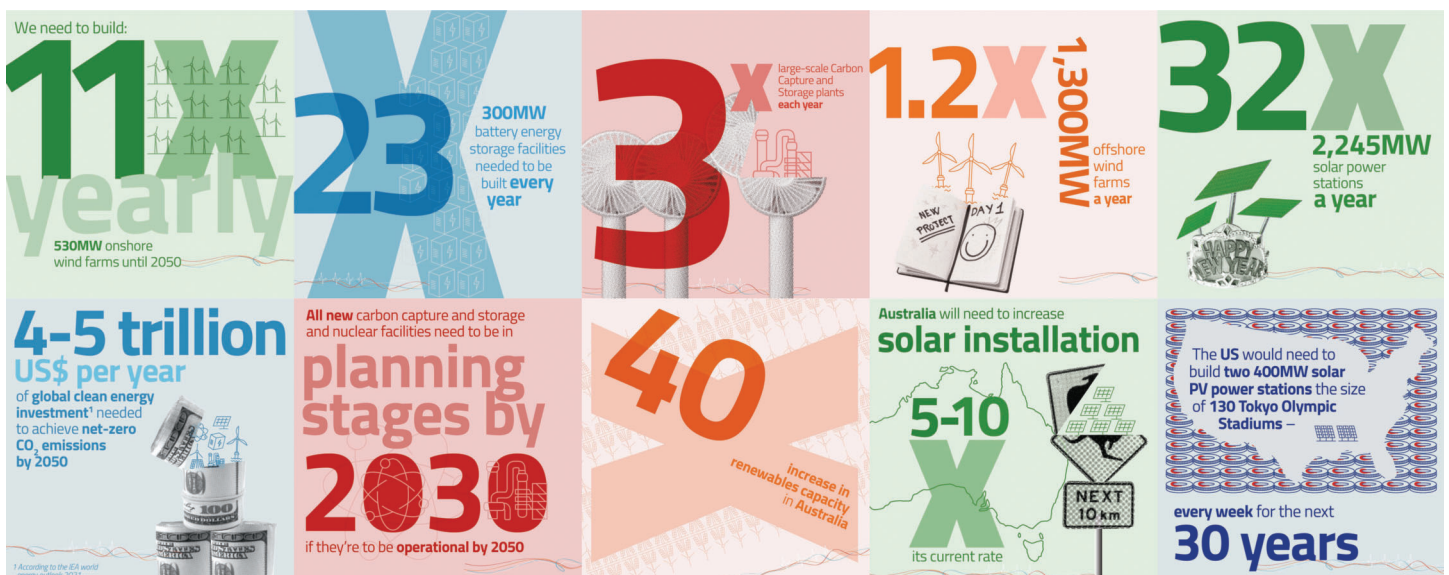
Apart from H2-driven fuel cells, the other main fuel types are ammonia and methanol. Their high power density, allows H2 fuel cell to supply a lot of power in a tiny, light design which makes them attractive for use in vehicles and for emergency power supply.

Renowned for their low-emission power generation, fuel cell generators fit well with Europe’s environmental targets which is why supportive policies and regulators have been set up to foster quick

adoption of the technology. Financial incentives, grants, and robust research funding have collectively catalyzed innovation and investments in the sector.

Leading manufacturers include Bloom Energy (US), Doosan Fuel Cell (South Korea), Ballard Power Systems (Canada), ABB (Switzerland), and Loop Energy (Canada).

Recent technology advancements, notably improved efficiency, durability and cost reduction, have made small-scale fuel cell generators in the range of up to 200 kWh more viable and attractive. They provide a reliable and efficient source of electricity for various on-board systems, including lighting, navigation, communication equipment, refrigeration, and other electrical loads. Analysts hence expect the >200kW segment to reap the biggest revenue and returns. ■



F-DLC coating for steam condensers boost power plant efficiency by 2%

Novel coating for steam condensers, made with fluorinated diamond-like carbon (F-DLC), could increase process efficiency at gas- and coal-fired power plants by 2%, researchers at the University of Illinois Urbana-Champaign find. Coated materials kept their hydrophobic properties for 1,095 days during test runs and are now subjected to six months steady condensation exposure at the university's Abbott Power Plant.

F-DLC coating improves heat transfer because the material is hydrophobic. That means, when the steam condenses into water, it does not form a thin film that coats the surface like water does on many clean materials and their oxides.

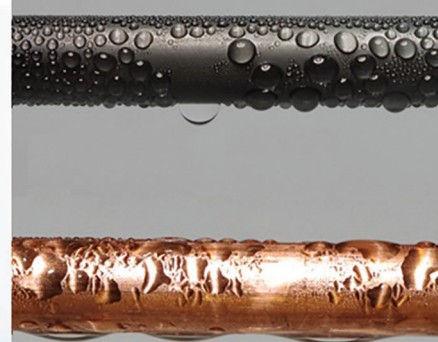
Instead, the water forms little droplets on the F-DLC surface which puts the steam into direct contact with the condenser and allows heat to be directly transferred. The researchers found this leads to a 2% increase overall process efficiency.

The efficiency gains in the steam cycle allow coal- and gas-fired power plants burn less thermal fuel and consequently emit some 460 million tons less of CO₂ and use 2 trillion fewer gallons of cooling water. The retrofit is hence deemed a bridging solution towards a more sustainable energy mix.

"A lot of CO₂ is going to be emitted be-

fore we get to a place where we can lean on renewable," said Nenad Miljkovic, a professor of mechanical science and engineering at UIUC and the project lead. If our F-DLC coating were adopted globally, it would noticeably curtail carbon emissions and water usage for the existing power infrastructure."

Prof Miljkovic and his team will now study the coating's performance for six under industrial conditions at the university's Abbott Power Plant. The cogeneration plant can use natural gas, coal, or fuel oil in its boilers and combustion turbines. The 80 MW plant has five primary types of energy sources: two gas turbines, each connected to a HRSG



The F-DLC coating at the pipe above allows the condensed water to form into droplets rather than a thin film covering the pipe below.

that captures the hot exhaust gases from the turbine and uses that heat to generate steam. Three gas-fired boilers and three coal-fired boilers concert the water to steam which is used to operate the steam turbine generators. The condensers – some now coated with F-DLC – tuns the exhaust steam back into pure water for reuse. ■

Solvent used at Calpine CCGT could trap 95% of emissions

Calpine's \$25 million project at the Los Medanos Energy Center, a combined-cycle power plant in Pittsburgh, California, is testing a technology that could capture up to 95% of carbon emissions while the CCGT generates electricity. The process uses a chemical solvent developed by ION Clean Energy to bind with CO₂ in the plant's flue gas.

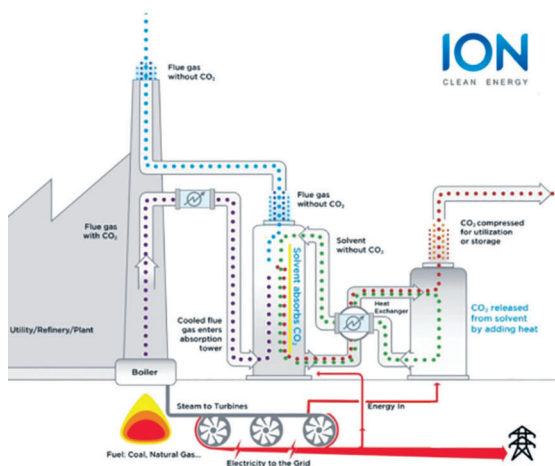
ION, headquartered in Colorado, said its process should be cheaper and more efficient than previous technologies to capture carbon emissions. However, the actual demonstration project at Los Medanos CCGT will not store the captured carbon to start with but release it back into the atmosphere. In future power plants, the carbon dioxide could be pumped into underground reservoirs for permanent storage.

Californian officials still hailed the technology as critical to reach climate targets. The state regulator wants power generators and industry to help eliminate the state's net carbon emissions by 2045, though some gas-fired power plant will need to be fired up occasionally to balance the grid and guarantee a stable supply of electricity.

CCS – a lifeline for gas-fired power plants

"Capturing that carbon, starting as soon as possible, will allow us to stop emitting in situations where we absolutely need these plants for reliability," commented Liane Randolph, chair of the California Air Resources Board.

Once tested and proven, California's largest power producer Calpine is likely to



retrofit most of its thermal power stations with carbon capture. Underlining the importance of the technology, CEO Thad Hill said: "For us, it represents the energy transition and natural gas's role in it."

The U.S. Environmental Protection Agency (EPA) earlier this year imposed caps on CO₂ emissions that operators of most coal- and gas-fired plants will have to meet. New standards are aimed at cutting emissions from fossil power plants 617 million tonnes between 2028 and 2042.

Under the EPA proposal, coal power sta-

tions set to keep running into the 2040s and gas power units with a capacity of 300 MW and more that operate at least half of the time are expected to install CCS that removes 90% of their carbon emissions by 2035. Alternatively, gas power units need to be co-fired with 30% hydrogen by 2032 and 96% hydrogen by 2038.

President Biden consequently raised pressure on the CCS industry to prove their technology is ready to help fight climate change while keeping some critical fossil power stations operational. ■

JERA's re-powered 1.5 GW Futtsu-Group 4 starts commercial operation

After completion of GE's largest scale flange-to-flange project in Asia, JERA's Futtsu Power Plant-Group 4 has entered commercial operation today and is delivering more than 1,500 MW of electricity to the Japanese grid. With an overall capacity of 5.6 GW, Futtsu consists of four groups and is fuelled by LNG, imported via an adjacent 11 mtpa regas terminal.

Futtsu is one Japan's largest and most critical power generation facilities as it is instrumental for keeping the lights on the Tokyo Metropolitan area. At Group 4, GE Vernova, JERA and the EPC partner Toshiba performed a flange-to-flange replacement to upgrade the installed three units to 9HA.01 gas turbine technology.

Commenting on the upgrade, JERA Futtsu Thermal Plant General Manager, Fumitaka Ninomiya said: "The Futtsu facility has now reset the clock on crucial assets, delivering 1.5 GW of electricity with more efficient technology that can help reduce emissions by burning fuel more efficiently."

Flange-to-flange projects entail a replacement of an older engine from inlet flange to exhaust flange. Works involve meticulous planning, precise engineering, and site modifications to seamlessly integrate the new turbines into the plant's existing infrastructure.

The cost-effective solution tackles multiple power gen needs at once, GE

pointed out, given that it extends the asset's lifetime, reduces emissions and enhances fuel flexibility and operating performance. Apart from the HA gas turbine replacement, Futtsu Group 4 now has an upgraded auxiliary system and Mark Vie control system and is covered by a 12-year equipment maintenance services.

Ramesh Singaram, CEO for GE Vernova's Gas Power Asia pointed out H-Class combined-cycle technology "not only leads to (...) enhanced cost-effectiveness, but also provides a pathway to co-firing with zero carbon fuels such as ammonia and hydrogen in the future." The U.S. manufacturer's collaboration with JERA dates back to 1951 when the company was formerly Chubu and Tepco, while the business relation with Toshiba is in place since 1875. ■



Installation works for the Futtsu 4-3 rotor

ContourGlobal selects Wärtsilä to service Senegalese power plant

Wärtsilä has been selected to service ContourGlobal's 86 MW Cap des Biches power plant near Dakar, Senegal for two years. Running on five dual fuel 18V46 combustion engines which can be converted to burn natural gas, the plant dispatches power to the national electricity distributor Senelec and reliability of supply is essential.

Cap de Biches was built by ContourGlobal in two phases: 53 MW that began generating electricity in April 2016 after only 14 months of construction, and a second phase consisting of 33 MW that broke ground in January 2016 and produced first electricity in September 2016. Situated on the Atlantic near Dakar, the combined-cycle plant consists of five HFO-fired diesel engines and a steam turbine.



Cap de Biches power plant near Dakar

to focus on their core business," Ara Hovsepian, ContourGlobal's CEO for Africa pointed out.

Wärtsilä has earlier supplied engines and energy storage systems for ContourGlobal power plants in various countries in Africa and the Caribbean. Marc Thiriet, Wärtsilä's energy business director, Africa called the accord "another step in furthering the relationship.

"Long-term service agreements are a central element in our lifecycle support approach to meeting the specific operational needs of our customers," he said, stressing: "They come with guarantees that promote both reliability and operational performance." ■

'Guarantee' limits plant downtime

The two-year service agreement with Wärtsilä includes all spare parts for major overhauls of the engines, optional field service personnel to carry out maintenance tasks, along with a 'guarantee' that limits the downtime during scheduled maintenance procedures. This allows the customer to meet its commercial obligations towards Senelec.

"This agreement provides us with important guarantees that will allow us to supply electricity to the grid in line with our commitments. Furthermore, it provides predictability of costs, while freeing our people

Iraq seals maintenance contract with Siemens for Rumaila power plant

Iraq's electricity ministry has signed a maintenance contract with Siemens Energy for the 3.1 GW Rumaila gas power plant near Basra, covering frequency regulation of operating units and spare part replacement. The government wants to prepare an action plan for plant maintenance, stressing "the readiness of generating units must be preserved from now until summer 2024."

Rumaila, a combined-cycle plant with a capacity of 3,155 MW, is powered by 12 gas-fuelled units driven by MAPNA's indigenous MAP2B turbines as well as six steam units. In April 2018, Siemens won a contract to expand the plant's generating capacity by 700 MW to its current capacity by adding SST-5000 steam turbines. According to the German equipment manufacturer, the combined-cycle upgrade ensured additional electricity supply at no extra fuel requirement while increasing efficiency by over 50%. ■



Rumaila power plant near Basra

LNG Journal Subscription Package

Your LNG Journal subscription includes broad coverage of LNG across the globe – from trade and shipments through to LNG prices, plus in-depth technical coverage. With over 20 years of LNG reporting experience, we remain the market leading source of information for decision makers in the LNG industry.

LNG Daily News

Delivered to your inbox and online



LNG Journal

The flagship LNG monthly



LNG Unlimited

Your weekly summary of LNG news



LNG Market Tracker

Weekly empirical insight into the LNG market



LNG North America

Bi-monthly report on LNG in the US, Canada



LNG Fuelling

In-depth look at LNG as a fuel



LNG Shipping News

Bi-weekly coverage of LNG shipping



LNG China

Bi-monthly review of LNG in China



LNG Monthly Markets

Key developments in LNG markets



Gas to Power Journal

Peakload Power and Energy Storage



Subscription Contacts

For new subscriptions or general subscription queries please contact:

Stephan Venter

venter@lngjournal.com

+44 207 017 3407

To renew an existing subscription or to upgrade your package, please contact:

Gabi Weck

gabi@lngjournal.com

Sign up now for an Online Subscription at only US\$1190; €920 or £830

Discount options are available for multi-users

Contact us for more information or to arrange a free trial