

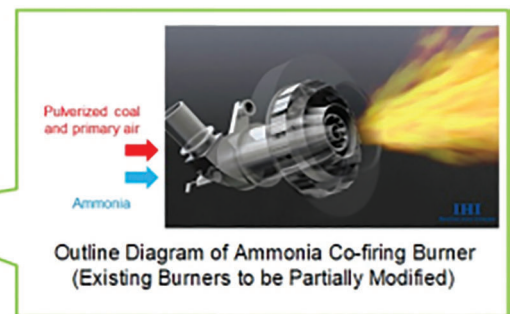
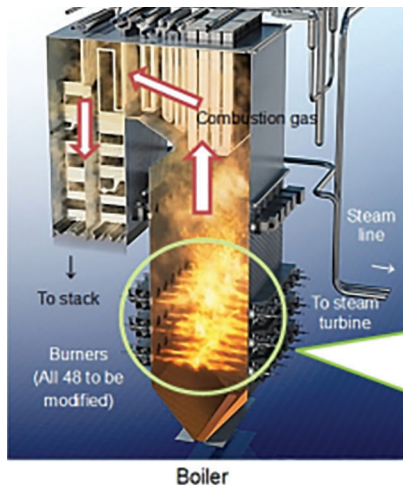


Aboitiz, JERA to test ammonia co-firing in the Philippines before 2030

AboitizPower is fast-tracking a feasibility study on co-firing ammonia with Japan's largest utility JERA, aiming to start test runs in the Philippines before 2030, assuming the price of the fuel will fall substantially by then. JERA will already start a 20% ammonia generation test in Japan this year, aiming for 50% co-firing by 2028.

As one of the Philippines' largest utilities, AboitizPower is partly owned by JERA and the Japanese major wants to roll out a similar concept in both island nations. "Though renewables plus batteries are technically feasible, the cost for batteries to maintain a stable power supply would be huge. Instead, utilising existing thermal power plants and co-fire them with ammonia makes better economic sense," explained Shinsuke Nakayama, head of JERA's Asia Platform Business.

Ammonia releases no carbon emissions when burnt and will initially be used to replace some thermal coal as a combustible fuel for power generation, though it may be later also used in gas-fired



plants. But Aboitiz Power's chief operating officer Felino Bernardo stressed that both the combustion technology and the supply chain needs to be developed before co-firing projects can be realised in the Philippines.

"We're looking at having that feasibility study starting early next year, aiming to get results within the decade," Bernardo said, adding: "If JERA can already start test in Japan [now], then hope-

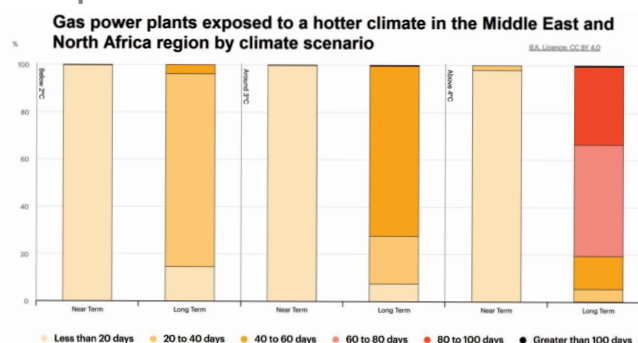
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IEA tells gas turbine operators in MENA to brace against extreme heat

Smouldering heat and more frequent drought are challenging energy systems in the Middle East and North Africa (MENA), undermining the efficiency of power generation and networks, the International Energy Agency (IEA) warns. Performance of gas-fired plants, accounting for 74% of electricity generation in the region, can be negatively affected by warmer air mass flow entering the gas turbine compressor.

According to the IEA's assessment, more than 80% of the installed capacity of gas-fired power plants in the region face an annual addition of more than 20 hot days (when maximum temperatures go above 35°C) in the period between 2081 and 2100 in a low-emissions scenario, and over 60 days in a high-emissions scenario, which are both significantly higher than the world average.

In the Arabian Peninsula, the level of exposure could go even higher, reaching around 90% of installed gas-fired capacity.



Increase in peak electricity demand

Higher summer temperatures trigger a notable increase in peak electricity demand with more extensive use of air conditioning. The number of cooling degree-days has risen by 0.6% per year in

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fully by 2030 the prices [of ammonia] have already gone down, so by that time we can do our own 20-30% test in the Philippines in one of our facilities."

Financial support for the study has been sought from Japan's Ministry of Trade and Industry (METI). "I think METI is the one who's going to finance it, specifically on the supply chain," Aboitiz Power's COO said in a media briefing. For now, price is still a challenge though ammonia is easier to store and transport than hydrogen given that it

can use existing infrastructure and ammonia carriers are already in place.

Eyeing LNG-to-power project of up to 1.2 GW

Apart from ammonia, AboitizPower and JERA are also evaluating adding up to 1.2 GW of LNG-fuelled power generation capacity on Luzon island. Several options are being considered, including an initial 600 MW plant that could be scaled up later to meet the Philippines' baseload power requirement by 2028.

The project is meant to include a new LNG regas and import terminal in Pagibilao on Luzon island, where Aboitiz currently operates several coal-fired power stations that could be used for ammonia co-firing tests. The utility wants expand its installed capacity in Luzon, Visayas and Mindanao to 9.2 GW, aiming for a 50:50 clean energy and thermal power mix. To this end, it is considering venturing into nuclear energy and has approached U.S.-based NuScale Power, said the CEO of Aboitiz Power, Emmanuel Rubio. ■

Onus to broker deal on an EU power reform now falls on Spain

With European member states failing to agree on a power market reform, the responsibility to reach a deal now passes to Spain which takes EU presidency from July until the end of this year. A compromise, allowing countries to subsidise existing power plants where equity investment covers at least 50% of the plant's value, was just voted down.

The proposal, tabled by Sweden, also stipulated that subsidies for retrofits would have to prolong the plant's lifetime by ten years or more. It also included conditions to avoid "overcompensation" of electricity generated by these units.

Clash over fixed-price power contracts

Germany, Austria, and Luxembourg are against plans to grant fixed-price contracts with the state to some existing power plants, arguing this could give some states a competitive edge and distort the common EU power market. Counting on new units, instead, Germany wants to set up auctions to ensure some 25 GW of hydrogen-ready gas power plants will get built by 2030 –

though this may clash with EU state aid rules.

France, in contrast, had supported the proposal in return for more favourable treatment of low-carbon nuclear energy. Fearing electricity shortfalls, the French government had urged EDF to produce more electricity from nuclear power stations, arguing 4% to 5% more output could be conceivable on some units to limit imports of gas-fuelled peaking power.

Struggle to reach deal before elections

The reform is meant to stabilise EU power prices and pre-empt the risk of a repeat of last year's energy prices when gas shortages escalated fuel prices and left consumers with escalating bills. Brussels is



striving to broker a deal on a final law, which EU countries need to negotiate with Parliament before the European elections next year.

The proposed tighter conditions for subsidies were meant as a compromise, singling out fewer power plants for state support. But even that proposal did not get the necessary backing to move to the next stage in the legislative process. ■

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

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the MENA region over the past four decades and IEA analysts expect this trend to continue, pushing average annual CDD up by over 30 under a low-emissions scenario and by around 1,400 under a high-emissions scenario in 2081-2100.

In Oman, peak electricity demand increased from 6 060 MW in 2015 to 7,081 MW in 2021 with an average annual growth rate of about 3%, largely attributed to greater air conditioning use. Peak electricity demand in Oman is projected to continue to rise by around 4% per year until 2027.

Reducing cooling water needs

More frequent drought coincides with extreme heat. Some Mediterranean countries have already made efforts to reduce cool-

ing water requirements and seek alternative water sources.

- Morocco is gradually replacing its coal-fired power plants with natural gas combined-cycle power plants which require less cooling water.
- Egypt adopted more water-efficient options for cooling new gas-fired plants (e.g., an air-cooling system for the 4.8 GW New Capital power plant) and reduced its dependency on freshwater by using seawater for the 4.8 GW El Burullus power plant.

Although these options could reduce water stress in the short term, IEA analysts stress "the only lasting solution is a transition to clean energy in the region as well as across the world." ■

Egypt's \$1.8bn offshore exploration plan could dent future gas demand

Egypt – together with Eni, ExxonMobil, Chevron, Shell and BP – has embarked on a \$1.8 billion programme to drill natural gas exploration wells in the Mediterranean Sea and Nile Delta. Produced gas could cover Egypt's fuel needs for power generation and LNG exports, though the country aims for renewables to contribute 42% of power gen capacity by 2035.

The five oil and gas majors are meant to be drilling 35 exploratory gas wells from now until July 2025 with 21 planned for the 2023-2024 fiscal year and 14 for the 2024-2025 fiscal year, Egypt's Petroleum and Mineral Resources minister Tarek El-Molla announced at an OPEC Energy Seminar in Vienna.

Over the past five years, Egypt and its international partners have been discovering over 200 oil wells and 67 gas wells. "These new resources have added 1.32 billion barrels of oil equivalent to the country's reserves," El-Molla said, specifying Egypt was initially targeting production from the Nargis, Satis, and Nour natural gas fields in the East Med, the East Damanhour field in the Nile Delta and the Faramid and Al Abyad fields in the Western Desert.

Once tapped and commercialised, the massive resource basis will underpin rising exports from the Idku and Damietta LNG terminals which are expected to produce 8 mtpa of LNG this year, up 14% from 7.5 mtpa in 2022.

Today, oil and gas produced in Egypt cov-

ers most of the country's energy demand, with hydrocarbons accounting for 93% of primary energy sources and satisfying 75% of consumption, Egypt's Petroleum and Mineral Resources minister Tarek El-Molla said. Going forward, the government aims for wind and solar, backed by energy storage, to make up nearly half of installed power capacity over the next twelve years.

President Sisi eager to avert electricity shortages

The political imperative to avoid blackouts and to ensure the consistent availability of electric power at peak times has been a defining feature of the presidency of Abdel Fattah el-Sisi, analysts noted. The collapse of the Mubarak regime and the brief rise and fall of the Brotherhood's Mohamed Morsi took place against a backdrop of a severe energy crisis. The long-term mismanagement of the gas production and export industry meant that by 2012 Egypt not only



had to cease gas exports, it also had insufficient production to supply domestic industry and power generation.

To avert future power shortages, President Sisi struck an €8 billion deal with Siemens in 2018 to build the three mega power plants – Beni Suef, New Capital and Burullus (4.8 GW each) – together with its consortium partners, Orascom Construction and Elsewedy Electric. The three CCGTs, along with some smaller wind and solar PV installations, helped raise Egypt's installed power generation capacity to over 47 GW, and boosted the available reserve to 25.7% of installed capacity. ■

Gulf-to-Europe hydrogen pipeline deemed feasible and economic

Low-carbon hydrogen produced in the Arabian Gulf region could be exported to Europe through a new pipeline under the Mediterranean, a feasibility study shows. Inspection and certification group RINA and engineering advisory AFRY found a pipeline linking Qatar, Saudi Arabia, Egypt and Greece could transport around 2.5 mtpa of hydrogen at an initial cost of €1.2 per kilo.

Gulf countries could, in turn, supply green and blue hydrogen to Europe at a levelized cost of delivered hydrogen of around €2.7/kg from the 2030s, falling to around €2.3/kg in the longer term, modelling shows.

Lining the Eastern Mediterranean and Europe had already been investigated for the EastMed Natural Gas project, though the decarbonisation focus makes developers look at clean-burning fuels like hydrogen and ammonia. At the same time, there are plans to export hydrogen and its syn-

thesis products from the Gulf to Europe by ship but RINA cautioned this "may not be most efficient for bulk transport."

Efficient complement to shipping

A competitive and actionable pipeline project from the Gulf region in the near future could provide a viable complement to shipping the fuel, making use of the Gulf re-

gion's favourable solar power conditions to produce cost-effective hydrogen.

"This first-of-its-kind study considers routing alternatives, technical parameters and feasibility, especially for the deep-sea pipeline section, geo-strategic framework conditions and top-level economic estimates of a direct hydrogen pipeline link between the Gulf and Europe as an element of an integrated green energy and industry system across Europe and MENA," said Andrea Bombardi, executive vice president at RINA.

"Together with AFRY, we have identified a potential stable corridor to bring supply and demand together. The scale-up of hydrogen adoption goes through projects like this," he vowed. ■



Cobalt-based catalyst can slash cost of producing hydrogen from water

Researchers at the U.S. Department of Energy's (DOE) Argonne National Laboratory say they have developed a low-cost catalyst for electrolysing clean hydrogen from water to help replace fossil fuels in the power sector. The trick is to use cobalt at the anode catalyst, rather than iridium which has a current market price of around \$5,000 per ounce.

Proton exchange membrane (PEM) electrolyzers can split water into hydrogen and oxygen with higher efficiency at near room temperature, which makes them well-suited for using renewable but intermittent sources, such as solar and wind. Separate catalysts are used at each electrode, the cathode and anode which produce hydrogen and oxygen, respectively.

A problem is that the anode catalyst uses iridium which is short in supply and hence costly which poses a major barrier for widespread adoption of PEM electrolyzers. "By using the cobalt-based catalyst prepared by our method, one could remove the main bottleneck of cost to producing clean hydrogen in an electrolyser," explained Di-Jia Liu, senior chemist at Argonne.

Deciphering changes in the catalyst

His team deciphered critical structural changes that occur in the catalyst under operating conditions by using X-ray analyses at the Advanced Photon Source (APS) at

Argonne. They also identified catalyst features using electron microscopy at Sandia Labs and at the Center for Nanoscale Materials (CNM).

"We imaged the atomic structure on the surface of the new catalyst at various stages of preparation," said Jianguo Wen, an Argonne materials scientist. In addition, computational modelling at Berkeley Lab revealed insights into the catalyst's durability under reaction conditions.

Aiming for fast commercialisation

Giner Inc., an R&D company working toward commercialisation of electrolyzers and fuel cells, evaluated the new catalyst using its PEM test stations under industrial operating conditions.

"The performance and durability far exceeded that of competitors' catalysts," researchers noted, hoping for a quick time-to-market. Once rolled out at scale, the cheaper electrolysing method will accelerate the renewables build-out and boost hydrogen production to facilitate a faster conversion of gas turbines to hydrogen co-firing. ■

NEWS NUDGES

BCCK helps mitigate nitrogen in the Permian

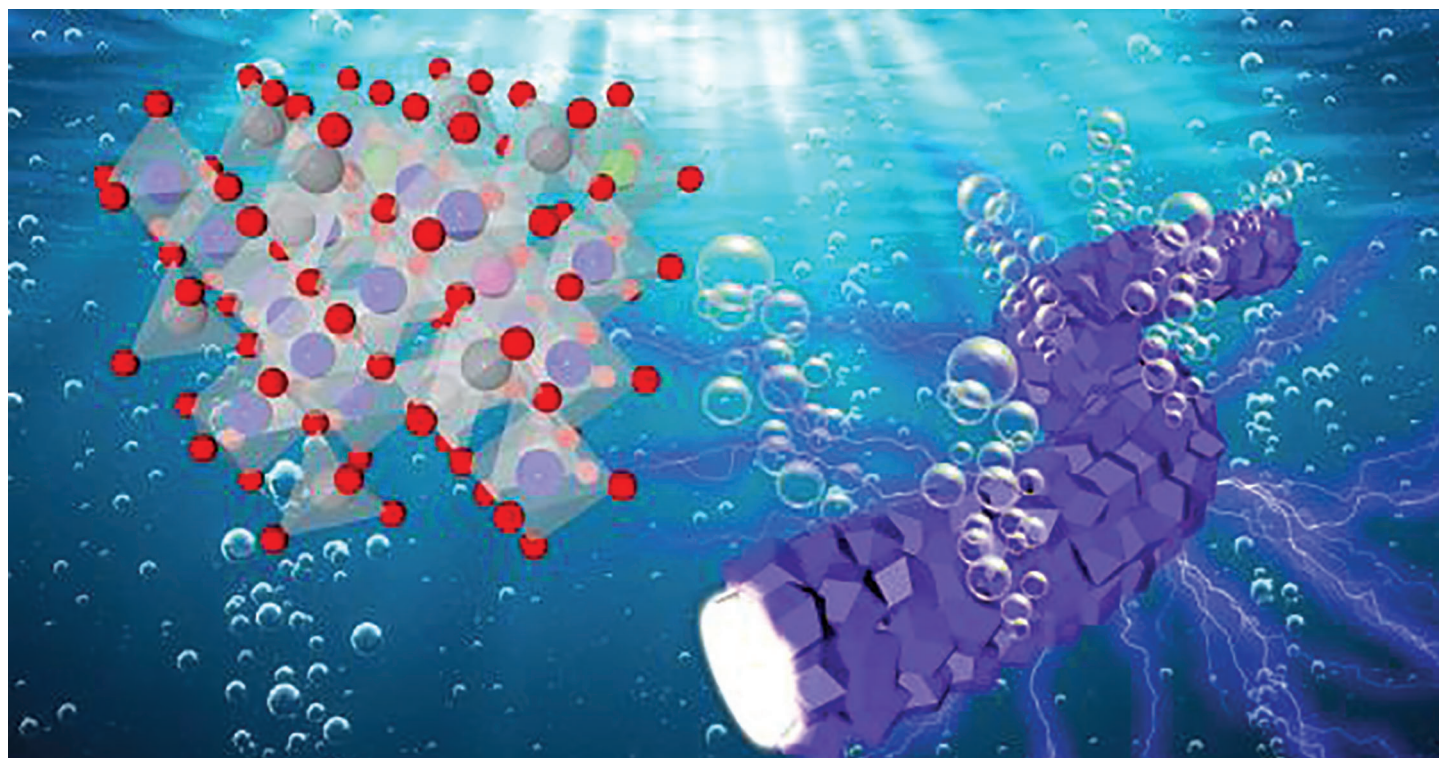
Texas-based engineering firm BCCK has delivered nitrogen rejection technology to shale oil and gas developers in the Permian Basin. The NiTech Style IV unit can adjust to compositional or flow capacity changes.

Saipem develops underwater drones

Italian energy services group Saipem has been awarded contracts worth approximately \$1 billion for carrying out EPCI offshore on behalf of Saudi Aramco and for developing underwater drones. The new autonomous subsea inspection robot will be based on the Flatfish AUV and first used at Petrobras offshore oil and gas developments.

Funding for CCS in fuel-from-waste process

Compact Synags Solutions, has won almost £4 million from the UK Department for Energy Security to test a method of capturing carbon from its process of turning waste into a pure hydrogen gas. Full-scale rollout of the technology could see 50 UK modules built to convert waste to liquid fuel that could capture 29,000 tonnes of CO₂ a year.



Oxygen bubbles evolving from fibrous, interconnected catalyst particles (right) during electrocatalytic reaction with water. Lattice structure for cobalt-based catalyst on left.

Omnis wants to rekindle 1.3GW West Virginia coal plant with hydrogen

California-based Omnis Global Technologies is in talks to buy the 1,300 MW Pleasants Power Station in West Virginia from ETEM, aiming to revive the shuttered 1,300 MW plant and run it on hydrogen. The co-fired hydrogen would be a by-product from Omnis graphite production but analysts are wary as converting a coal power plant to combust hydrogen is untested.

Pleasants had been owned and operated by Energy Harbor, which transferred the plant to Energy Transition and Environmental Management (ETEM) for demolition. The plant ceased operation on June 1, though some state leaders wanted it to stay onstream.

Omnia co-owner Simon Hodson told E&E News his company has sealed a letter of intent to buy the plant, has secured financing for the purchase with a deadline of July 31 to close the deal.

Producing H2 in a quantum reformer

Elaborating on the technology, Hodson explained Omnis plans to build a so-called quantum reformer next to the power plant. That facility would heat hydrocarbons at very high temperatures to produce synthetic graphite, and generate large quantities of hydrogen as a by-product. In turn, the hydrogen would be used to co-fire Pleasants Power Station to produce electricity. Hodson called the plan an "opportunity to save the coal-fired plants by retrofitting them," which in his view would help keep electricity prices down.

Aiming for 100% hydrogen combustion, Omnis is working with the Oklahoma-based firm Zeeco which developed suitable turbine technology. A Zeeco spokesperson confirmed it had sent engineers to Pleasants



Pleasants Power Station along the Ohio River near Belmont

Power Station to "confirm the viability of converting it to hydrogen."

Scepticism over unprecedented conversion

Analyst doubt the plan to save the 34-year old mothballed Pleasants plant is feasible. If the purchase deal happens, it is not known what timeline Omnis has for bringing the plant back into operation, or whether it would even continue to use coal.

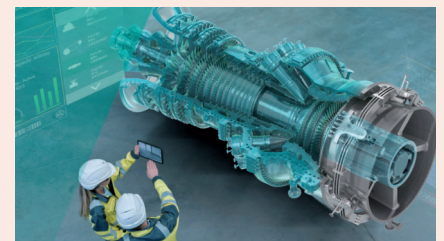
"The whole thing is really mystifying to me," said Seth Feaster, analyst at the Institute for Energy Economics and Financial Analysis (IEEFA). Omnis is not known for ever having run a coal power plant and their proposed conversion appears unprecedented and untested. "Let's say you're producing graphite, do you need a 1,300MW power plant to do the graphite production? That strikes me as oversized. ... Other companies that produce graphite aren't buying power plants."

Doosan wins turbine order for Komipo combined-cycle plant

Doosan Enerbility has secured a 280 billion won (\$214.3m) order from Korea Midland Power (Komipo) to supply a domestically-developed, hydrogen-ready gas turbine and other key equipment for a combined-cycle power plant in the coastal city of Boryeong. The 569 MW project, built on behalf of KEPCO, is due completed by June 2026.

Since a handful of overseas manufacturers dominate the global turbine market, South Korean power plants used to run on imported turbines. But in 2019, Doosan became the fifth company in the world to develop a gas turbine for power generation, with the 270 MW turbine having been first installed at a cogeneration plant in Gimpo.

The turbine delivered for the Boryeong CCGT can be retrofitted to run on hydrogen, since Komipo intends to convert the plant to run on a natural gas and hydrogen blend in the near future.



Render of Doosan's H2-ready gas turbine

Alba Power Station 5 expansion on track to be completed in Q4-2024

Expansion of Alba Power Station 5 Block 4 is progressing on schedule to be completed in the fourth quarter of 2024, the chairman of Aluminium Bahrain (Alba) Shaikh Daij bin Salman said. Adding a fourth block with 680.9 MW capacity, powered by a M701 JAC gas turbine, will increase the plant's overall capacity to 2,481 MW.

Alba, the world's largest aluminium smelter outside China, reached financial close on the PS5 Block 4 expansion in Bahrain in November last year. The fourth block will have a similar configuration as previous units and tie into the existing 220kV substation.

Project finance includes a \$225 million China Export and Credit Insurance Corporation (SINOSURE) supported debt-facility at a "competitive interest rate." Alba noted the principal amount needs to be repaid over a 15-year period, though there is a three-year grace period.

Higher CCGT efficiency than at Station 3&4

Mitsubishi and the Chinese contractor SEPCO III were selected to handle engineering, procurement and construction works for block 4. The project will see the addition of a fourth combined-cycle power block in 1:1:1 configuration, though the efficiency for this new CCGT unit will be "much higher" than those of Alba's Power Station 3 and 4, the company said without specifying.

Block 4 will be powered by a M701JAC gas turbine, an air-cooled version of J-series gas turbines and a

steam turbine. JAC gas turbines can run on up to 30% hydrogen fuel by volume and Mitsubishi aims to reach 100% hydrogen fuel in the future with minimal infrastructure modification.



Alba Power Station in Bahrain

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