



Weekly News

24 May 2024

AEP wants data centers to pay for pre-booked electricity upfront

American Electric Power (AEP) has filed a request with the Public Utilities Commission of Ohio to mandate data centres with loads greater than 25 MW and crypto-mining operations greater than 1 MW to pay at least 90% of the electricity they pre-booked each month, even if they use less. AEP wants them to commit for 10 years upfront to enhance planning security.

Connecting large electricity users to the grid requires substantial investment in new transmission lines, which takes at least seven years to plan and build, AEP argues. The utility hence wants data centres to firmly commit in advance how much electricity they will consume, and pay for it. Similar to the use-it-or-lose-it principle.

The novel rate structure would empower AEP Ohio to invest in grid expansions where they are most urgently needed and offers data center and cryptocurrency mining customers "a clear understanding of their obligations as customers."

"While we see no concerns serving current or new residential and existing commercial or industrial customers, we need to ensure that the right long-term investments are made to the electric grid," said Marc Reitter, AEP Ohio president and chief operating officer. "We need accurate plans and solid commitments from large data center customers so the right facilities are built at the right time."



Render of Meta data centre in Albany, Ohio

Ohio is facing unprecedented electricity demand from data centres, notably in the central part of the state. According to AEP testimony to state regulators, data center load will likely reach of 5,000 MW in Central Ohio by 2030, based on signed agreements with the utility. As of April 2024, actual data center load was around 600 MW in Central Ohio.

A similar surge in data centre build-out is underway in Loudoun County, Virginia, where Dominion Energy is struggling to meet growing electricity demand. Data centres accounted for 24% and 21% of Dominion's electricity sales in 2023 and 2022, respectively.

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Projected 10 GW wind farm could save Egypt \$5 billion per year in gas costs

Masdar, along with Infinity Power and Hassan Allam Utilities are a step closer to building a \$10 billion wind farm in Egypt, having just signed a land access agreement. Designed to produce 49,790 GWh of electricity, the 10 GW wind farm will save the country an estimated \$5 billion in natural gas costs per year for fossil power gen.

The agreement gives the consortium access to a 3025 square-kilometres area of land in West Suhag, and will allow the consortium to conduct the necessary development studies to progress the project. This will include resource measurement campaigns as well as geotechnical and topographic surveys whose findings will be vital for construction.

Pushing the limits of scale

Once built and operational, the wind farm will produce 47,790 GWh of electricity per year and cut around 9% of Egypt's annual carbon emissions by displacing 23.8 million tonnes of CO₂ annually, Masdar said, stressing this helps Egypt to meet its



strategic objective of sourcing 42% of its energy from renewables by 2030.

"At 10GW, this landmark project is pushing the limits of innovation and scale as we work to help

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It's not only the growing number of data centre customers, the size of each one has increased substantially. Historically, some 30 MW were enough to cover the demand of one data centre, but recent requests are for 60 MW to 90 MW. Today, there are also data centre campuses which could need anything between 300 MW and several

Gigawatt (GW).

Scale, scope and timing of electricity supply are of the essence given that the ramp up of modern data centres has accelerated, hence the need large amounts of electricity in an ever-shorter time span.

According to McKinsey projections, data centres' electricity demand in the US alone

is expected to reach 35 GW by 2030, up from 17 GW in 2022. Both utilities and grid operators are faced with a significant load growth due to growing electrification of industry and transport, as well as data centre development. This especially holds true in PJM Interconnection but also in the Electric Reliability Council of Texas (ERCOT). ■

Philippine gov' wants to give power plants more time for maintenance

Regulators in the Philippines want to give power plants more time for maintenance and repairs to enhance energy efficiency and prevent unplanned outages. Energy Secretary Raphael Lotilla said operators "will be able to take a deep dive into really [inspecting] the different parts of the plant," so the move is not meant to be "purely punitive."

During the 2022 national election, the maintenance schedule of several system-relevant plants had to be postponed which affected the plants subsequent performance, Lotilla recalled, stressing a similar scenario needs to be avoided at all cost this time round.

"We have another election so we're preparing [and] we're hoping that by that time in 2025, the El Niño will not recur," he said, explaining the Philippine Department of Energy (DOE) hence wants plant operators to have enough time to rehabilitate and optimise their power plants beforehand.

Permitted downtime differs greatly

Resolution No. 10, issued by the Energy Regulatory Commission (ERC) back in 2020, detail the "allowable number of outage days" in relation to the power plant type:

Combined-cycle gas power plants are given 20.2 days, gas turbine-driven generators 29.2 days, diesel fired plants 19 days – while plants combusting pulverized coal get

a total of 44.7 days, and coal plants with circulating fluidized bed technology get up to 32.3 days.

Breaches of the number of permitted outage days can result in substantial fines and penalties. Last year, the regular imposed about 60 million Philippine Pesos in penalties on 14 power generating companies for not complying with the allowable number of outage days. ECR chair Monalisa Dimalanta wants these monies to be use to refund customers, notably industries whose production can be adversely affected by prolonged outages and restricted electricity supply.

H2-ready plants in the making

Eager to clean up the power generation mix, the regulator supports plans for hydrogen co-firing like ENEX Energy projected 1,100 MW combined-cycle gas power plant in Batangas. To be built at a cost of 60 billion Philippine Pesos (\$1.08bn), the CCGT will be capable use hydrogen for up to half of its fuel needs once it starts commercial



Quezon coal power plant (460 MW)

operation in mid-2026.

Situated in the Batangas Bay area, close to Metro Manila, the power project will be fuelled by LNG from a nearby regasification plant and clean-burning hydrogen. Named 'Batangas Clean Energy Inc.', the project is jointly owned by Blackstone affiliate Gen X and ENEX which pursues permits and prepares construction.

Market observers expect FID to be taken this year – not least because the Department of Energy hence ranks it as an "energy project of national significance" due to its substantial nameplate capacity. Once in full swing, the 1,100 MW plant will generate enough electricity to cover up to 10% of demand in the Luzon power grid. ■

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unlock Africa's clean energy potential," said Masdar CEO Mohamed Jameel Al Ramahi.

With near-zero operating costs, the 10 GW wind farm will save the country an estimated \$5 billion in natural gas costs per year by reducing the need to dispatch gas-fired power stations. "This source of clean, affordable energy will save Egypt money, reduce emissions and power industry across the country," commented Infinity Power

chairman Mohamed Ismail Mansour.

The venture in West Suhag "will show that, by setting bold targets, countries can embrace and adopt renewable energy and transform their energy mix," Infinity Power CEO Nayer Fouad noted. The project agreement was signed between the Consortium and the Egyptian Electricity Transmission company in late 2022 at the sidelines of the UN climate change conference, COP27. ■

Asian LNG demand response limits downside to Europe's fuel-switching prices

Downside risk to fuel-switching prices in Europe is expected to weigh on the TTF near curve, although Asian LNG demand response will limit the price decline. Energy Aspects forecasts suggest €2/MWh of downside to balance-of-summer European fuel-switch prices, which means the TTF can price at €28/MWh without pricing less competitively versus coal in the power sector.

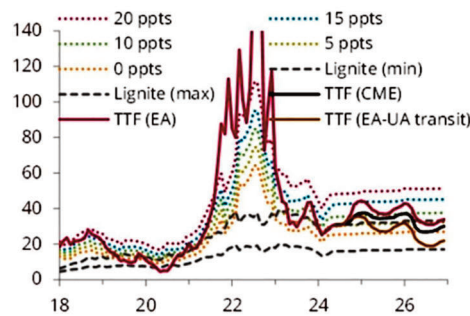
Delivered coal prices at for balance-of-year look "fair value" around \$110/t – but EUA Dec-24 carbon prices look "overvalued" at €71.90/t, analyst noted, pointing to their fair-value estimate of €63/t. Factoring in the downside to fuel-switch prices means TTF gas can trade at €28/MWh without pricing less competitively versus coal in the power sector.

Prices at the Dutch Title Transfer Facility (TTF) currently "look fair value," analysts find, though uncertainty about the continuation of Russian pipeline gas imports through Ukraine is likely to make European buyers rush to fill storage through the summer. Structurally weak demand in a slow economy means that Europe can achieve a high end-October carryout while pricing low in the power-sector fuel-switch range. EUA prices, in contrast, are deemed "overvalued" and consequently lower fuel-switch prices weigh on TTF near curve prices.

Fall in TTF prices would trigger LNG tendering in Asia

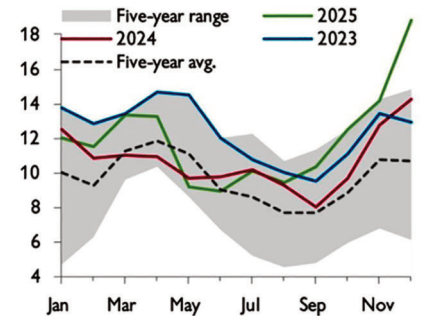
But lower absolute TTF prices will lead to a rise in Asian LNG tendering which in turn could force TTF prices to rise in the Euro-

TTF vs coal-to-gas fuel-switch triggers, €/MWh



Source: Bloomberg, LSEG, CME, ECB, Energy Aspects

European LNG receipts, bcm



Source: Vortexa, system operators, Energy Aspects

pean power-sector fuel-switch channel so that the continent can achieve a high end-October carryout, analysts explain.

European traders are unlikely to use Ukrainian storage due to recent attacks on such infrastructure, but rather use floating LNG storage to tighten a loosening of the late-summer balance. According to Energy Aspects modelling, Europe will fill end-October stocks to 106.1 billion cubic metres (bcm) while pricing at the 5-ppt fuel-switch trigger is slightly down year-on-year.

The June–October stockbuild in Europe

could, however, be slowed by lower LNG imports at -6.7 bcm y/y, despite higher Norwegian production, as Asian LNG demand is likely to increase by 7.2 bcm y/y. Energy Aspects says they observed Asian buy-tender activity pick up strongly once JKM prices drop towards €22/MWh, equalling \$7/mmbtu, helping to pull LNG away from Europe. TTF prices around this level would trigger additional 0.36 bcm/m of Asian LNG demand and the TTF would have to price higher for Europe to maintain its high storage fill. ■

China's LNG imports jump over 30% in April as economy improves

Shipments of LNG to China jumped 31.5% year-on-year to 6.22 million tons in April as the economy gathers speed and annual LNG imports are on course to reach around 77 million tons. Speed and scale of China's gas demand recovery will largely determine global LNG prices as markets stay tight until early 2027.

With new US LNG export capacity not coming onstream until the end of 2026, at



China onshore LNG tank

the earliest, considering the Biden administration's halt in export approvals, markets are bound to stay in short supply. Qatar jumped to the occasion and is rushing to begin production at North Field West with a view to expanding the world's biggest LNG project. Until then, analysts at Moody's expect LNG prices and availability to depend largely on the speed and scale of China's gas demand recovery.

Moody's anticipates China's LNG imports will rise by around 10% in 2024, similar to the increase last year as the economic recovery is only slowly gathering traction. In 2023, China's LNG imports increased by around 12 bcm to 97 bcm from 2022, close to Moody's revised estimate of a 14 bcm increase, but still below the levels reached in 2021.

Latest data, released by the Chinese government this week, shows April deliveries were nearly 1.5 million tonnes higher than LNG imported in April 2023, signalling the scale of the country's economic recovery. However, deliveries in April were a tick lower than volumes delivered in March.

For the January-to-April period, LNG shipments to China totalled 25.1 million tons, putting the Peoples' Republic on course for annual imports of around around 77 million tons, up from last year's 71.44 million tons when the nation regained its No. 1 spot as the world's largest LNG importer. This was 5.29 million tons ahead of the Japan's annual total of 66.15 million tons, a decline for the Japanese in the year of 8.1 percent compared with 71.99 million tons in 2022. ■

Low-carbon technologies most exposed to high interest rates

If record interest rates persist, the higher borrowing costs will adversely affect renewables and nascent low-carbon technologies, Wood Mackenzie finds. In the US, a 2% rise in the risk-free interest rate pushes up the levelised cost of electricity (LCOE) by as much as 20% for renewables, but only by 11% for a combined-cycle gas turbine plant.

“Interest rates, which have risen sharply in the past two years, may not come down as far or as quickly as markets anticipate,” said Peter Martin, WoodMac’s head of economics said, suggesting this could slow down the pace of the clean energy transition.

The high capital intensity of nuclear power and renewables make them vulnerable to interest rate increases and low returns mean future projects will be at risk. In contrast, due to low gearing, many companies in the metals and mining as well as the oil and gas sectors are relatively unaffected by higher interest rates.

The competitive of renewables over fossil power sources is also suffering when borrowing costs are high: In the US, onshore wind can generate electricity at an LCOE of \$40/MWh, 50% of the cost of gas-fired generation. However, WoodMac analysis finds that higher interest rates are eroding that advantage.

“While power and renewables companies have higher gearing, they do compare favourably with other peer groups on a cost-of-debt basis. But this is precisely what makes them more sensitive to interest rates. Mechanisms to reduce price and offtake risk enable power and renewables companies to

obtain debt more cheaply than the relatively risky oil and gas and metals and mining sectors. The recent rise in interest rates, therefore, has a larger proportional impact on their cost of debt,” Martin explained.

Green tech under pressure

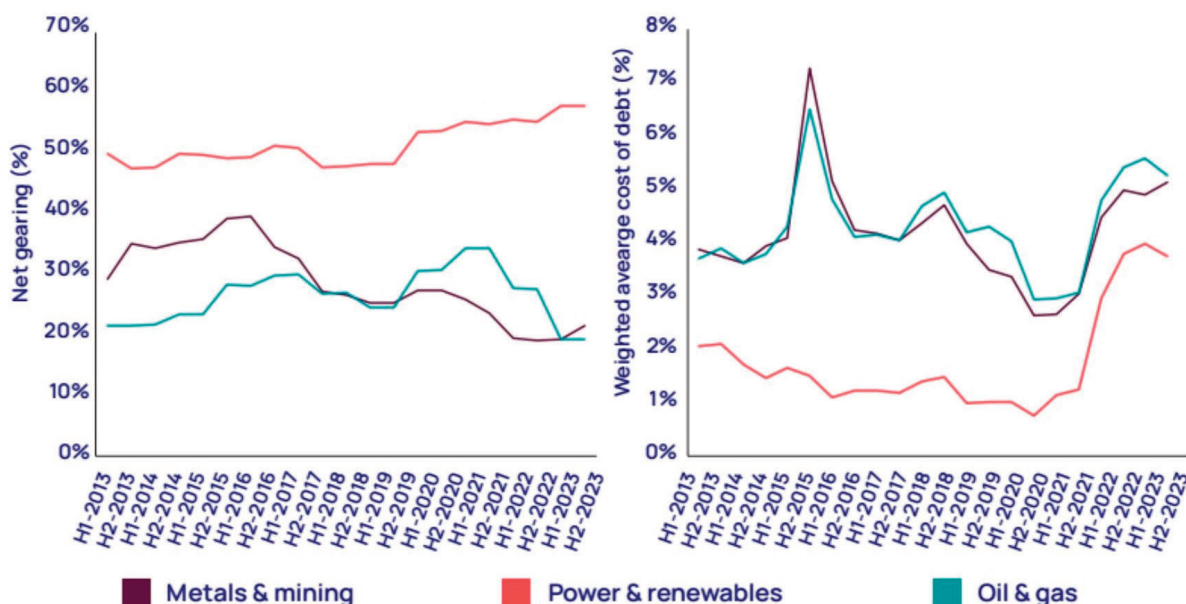
Nascent technologies like low-carbon hydrogen, carbon capture, utilisation, and storage (CCUS) and direct air capture (DAC), still have remarkable levels of capital investment which makes them vulnerable to higher interest rates.

“The lack of economic incentives to capture carbon and the lack of a market for hydrogen are the most significant obstacles to investment in these sectors, but for projects that do progress, higher interest rates hurt the economics,” he said, noting: “This affects both smaller development companies that struggle to access debt and larger, credit-worthy emitters that rely on low-interest leverage to render projects attractive for shareholders.”

An estimated \$75 trillion in investment are needed, if the world is to reach net zero by 2050 – but sustained high interest rates might well significantly slow the pace of the transition, which is why more policy support and faster permitting will be needed to stay on track.



Cost of debt rising fastest for the highly geared power and renewables sector



Source: Wood Mackenzie Corporate Strategy and Analytics Service, Factset. Net gearing represents net debt over book value. Sector averages are weighted to companies' book value

Source: Wood Mackenzie Corporate Strategy and Analytics Service, Factset. Cost of debt sector averages are weighted to total debt, in US dollars.

Hygenco and Mitsubishi to deliver green H₂-fuelled CCGTs in India

India-based Hygenco Green Energies has teamed up with Mitsubishi Power and MHI to deliver green hydrogen- or ammonia-fuelled combined-cycle gas power plants in India and abroad. Hygenco promised to supply commercially attractive H₂ and NH₃ on a gas-as-a-service basis, while Mitsubishi will deliver the CCGTs on a build-own-operate basis.

“The collaboration will synergise Hygenco’s green fuel supply for Mitsubishi’s technology in India and globally,” Gurgaon, India-based Hygenco stated.

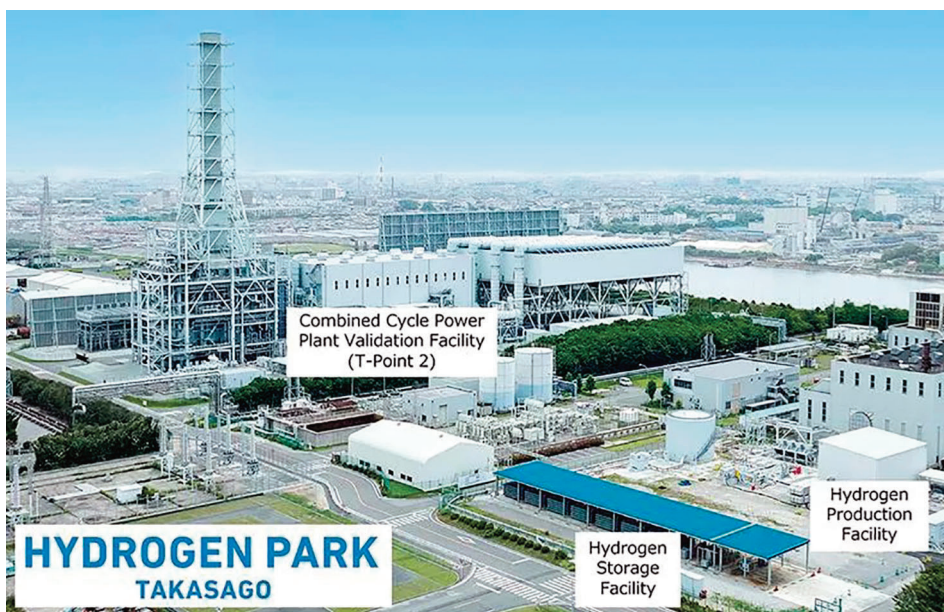
Mitsubishi Power has developed hydrogen co-firing technology with a view to converting the combustion system of existing gas-fired power plants to decarbonise these assets and prolong their lifetime in the face of more stringent emission rules.

Tests and validation at T-Point 2 in Takasago

The Japanese manufacturer successfully carried out a fuel blend of 30% hydrogen and natural gas – both at partial and full load – using a 1,650°C class J-series Air-Cooled (JAC) gas turbine. The demonstration took place at the T-Point 2 CCGT validation facility with a rated output of 566 MW within Takasago Hydrogen Park. Several co-firing projects followed in Japan and Europe, and Mitsubishi now views as an attractive new market.

Hygenco is already developing green hydrogen in India and has a strategic goal of deploying over US\$300 million (€296m) worth of green hydrogen projects across India over the next three years. In this con-

text, it recently sealed India’s first long-term green hydrogen off-take contract with stainless steel producer Jindal Stainless to build, own and operate a multi-MW-scale facility within the next 12 months. ■



ADNOC delivers first CCS-enabled ammonia shipment to Japan

Abu Dhabi National Oil Company (ADNOC) has delivered what it claims to be the world’s first certified bulk commercial shipment of low-carbon ammonia, enabled by carbon capture and storage (CCS), to Mitsui for use as a clean fuel for power generation in Japan. The cargo, sourced from Fertil’s facility in Ruwais, will see the CO₂ stored in a carbonate saline aquifer.

The ammonia shipment, produced by Fertiglobe was facilitated by ADNOC’s \$23 billion investment in decarbonisation and low-carbon technologies as it seeks to support customers to decarbonise operations, particularly in hard-to-abate sectors. Shipment of the cargo to Japan builds on previous demonstration cargoes delivered to customers in Asia and Germany.

“Delivery of the world’s first certified bulk commercial shipment of CCS-enabled low-carbon ammonia to Mitsui in Japan is testament to ADNOC’s commitment to accelerating the development of lower-carbon fuels to support a just, orderly and equitable energy transition,” said ADNOC executive director for Low Carbon Solutions, Musabbeh Al Kaabi.

The International Energy Agency (IEA) estimates that hydrogen will account for around 10% of global energy consumption for the world to reach net zero by 2050. As an early mover in hydrogen production, ADNOC aims to capture 5% of the world’s hydrogen market by 2030 and venture into ammonia as the most promising at-scale hydrogen carrier.

Ammonia co-firing trial underway

Power generators in Japan, notably JERA, are working on co-firing ammonia at their existing thermal power stations. In early May, demonstration testing has kicked off for the world’s first 20% ammonia co-firing test at the utility-scale Hekinan power plant in Japan. To that end, plant operator JERA secured 40,000 tons of grey ammonia from Mitsui for the trial, which is scheduled to run through June 2024.

With an installed capacity of 4,100 MW,



Hekinan is the largest coal-fired power station in Japan, consisting of three 700 MW units and two 1,000 MW units. Co-firing tests focus on Unit 4, commissioned in 2001 and equipped with a turbine and generator from Toshiba and a boiler from IHI.

Ammonia (NH₃), a derivative from hydrogen (H₂), emits no carbon dioxide (CO₂) when burnt but the fuel as an inherently lower flammability which makes it harder to combust than natural gas and the process is susceptible to form during NH₃ combustion. ■

Curaçao facilitates renewable build-out with Wärtsilä battery system

Aqualectra, Curaçao's government-owned utility, has turned to Wärtsilä to supply a 25 MW/ 25 MWh battery energy storage system to enable the expansion of wind and solar power capacity on the Caribbean island. The equipment is scheduled for delivery in early 2025, with the battery due operation before the end of June.

Aqualectra is an existing Wärtsilä customer and operates three engine power plants, comprising a total of 16 generating sets.

The state utility's strategic objective is to provide the community with affordable, sustainable, and reliable electricity. "The

Wärtsilä solution will support all these objectives by reducing generation costs, enabling the integration of renewables, and decreasing CO2 emissions, while providing high reliability," said Joseph Everon, advisor to Aqualectra's chief technical officer (CTO).

The order award follows a detailed modelling of the power system to determine the best way forward.

The battery, together with the GEMS digital energy platform will provide the reserves needed to improve asset loading, which in turn enhances the availability of electricity on the grid, specified Christoffer Ek, Wärtsilä's director of decarbon-

isation services. The Finish manufacturer is keen to help the Caribbean decarbonise and claims it is ready to "continue serving this market for decades to come." ■



Bird's eye view of Willemstad, Curaçao

First CO2 battery project gets ready for Q3-24 start-up

Works on Energy Dome's first thermo-mechanical energy storage are advancing fast, based on a €35 million project level grant and €25 venture debt. The project in Sardinia will use a 20MW/200MWh CO2 battery, capable to deliver electricity for 10 consecutive hours, alongside a 20 MW CO2 expander supplied by MAN, with start-up planned in the third quarter.

The funds will be made available through the EU-Breakthrough Energy Catalyst partnership which invests in emerging climate technologies to accelerate their adoption and reduce related costs. Mario Fernandez, head of Catalyst at Breakthrough Energy singled out long-duration energy storage as a "critical enabler" of the clean energy transition.

The CO2 battery draws on the energy of CO2 when changing between its gaseous and liquid state. When in charge mode, the CO2 is withdrawn from an atmospheric gasholder – the Dome and then compressed (which generates heat), liquefied and stored in vessels under pressure at ambient temperature. When energy is needed, the CO2 is heated up, evaporated and sent into an expander which drives the generator in order to feed climate-neutral electricity into the grid.

Claudio Spadacini, founder and CEO of Energy Dome claims the CO2 battery's high round-trip efficiency and Capex require-



Render of Energy Dome's CO2 battery in Ottana, Sardinia

ments are "significantly more competitive than the Lithium-Ion benchmark."

The maiden unit in Sardinia will be the first of a series of identical units, allowing Energy Dome to reduce cost and improve the bankability of future units. The modular CO2 Battery does not use materials from rare metals, Energy Dome said, stressing "its main components are based on already existing and known supply chains."

MAN Energy Solutions will supply a 20 MW CO2 expander, with the turbomachinery due to be shipped in summer 2024 for installation. ■

GE aeroderivative turbines to power Anadarko Plant

Western Farmers Electric Cooperative's (WFEC) has handed an order to GE Vernova to install two aeroderivative LM6000VELOX package solutions, each with an LM6000 gas turbine and a generator, to replace aging steam turbines at its Anadarko Plant in Oklahoma. When the expansion will be completed, the Anadarko Plant is expected to deliver up to 350 MW.

WFEC has selected Chicago-based Sargent & Lundy as the owner's engineer for the expansion of the plant. Both worked hand in hand on selecting the appropriate technology for these new units and developing a turbine specification.

Fagen has been selected as the EPC contractor. Works are expected to start in late 2024 and be completed in late 2026.

Anadarko Plant is currently powered by five LM6000 PC gas turbines, two installed and commissioned in 1999 and another three units installed ten years later, in 2009. Once expanded, the plant will be powered by a total of seven aeroderivative turbines, derived from jet-engine technology.

Aeroderivative turbines are well-known in the power generation industry for their quick start time in as little as 5 minutes to full power. They will complement WFEC's robust portfolio of almost 1,000 MW of renewable projects already in service or scheduled to be operational by 2030. ■



WFEC's Anadarko Plant

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