



Weekly News

9 April 2021

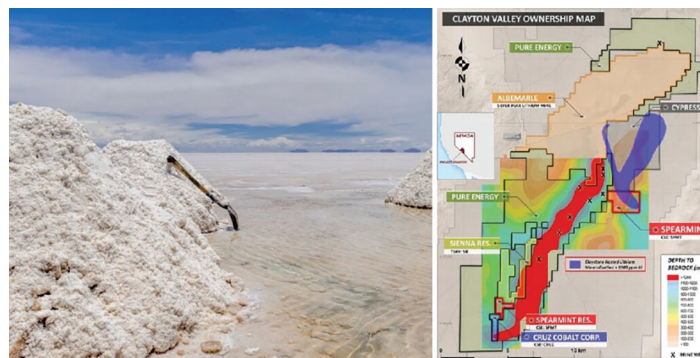
Schlumberger develops lithium extraction pilot plant in Nevada

Schlumberger New Energy, the energy transition start-up of the US oilfield service giant, is working on a lithium extraction pilot plant in response to growing demand for utility-scale battery storage in the transport and power sector. To be built through NeoLith Energy in Clayton Valley, Nevada, the pilot plant is due operational before the end of 2021.

The Neolith approach uses a new direct lithium extraction process to facilitate the production of high-purity, battery-grade lithium material. According to Schlumberger, the new process also reduces production time from more than a year to only weeks.

"Nevada's lithium resources present an excellent opportunity to demonstrate a leap in production efficiency," Ashok Belani, Schlumberger New Energy executive vice president, said noting the pilot plant will benefit from the company's expertise in the subsurface domain, development of process technology, and global deployment of technology at scale. As for the commercial aspect, Belani stressed: "We are accelerating the deployment of our pilot plant in response to the high market demand for battery-grade lithium material."

Deployment and start-up of the lithium extraction pilot plant is part of Schlumberger's agreement with Pure Energy Minerals with Schlumberger to develop its Nevada lithium brine property, using



a novel DLE process to brine and extract high-purity lithium.

Schlumberger New Energy has already spent over \$15 million in this direct lithium extraction (DLE) process, and expects the construction and operation of the pilot plant in Nevada will require "a similar amount of investment."

Demand for lithium surges

Lithium is a chemical element that is used in most utility-scale battery storage projects as well as for electric vehicles, hence various analysts forecast demand for the raw material will see double-digit growth over the next few years.

In fact, figures by the U.S. Energy Storage Association show that the capacity installed in 2020 "broke all records" by reaching 3,500 MWh. Energy storage, installed across the United States,

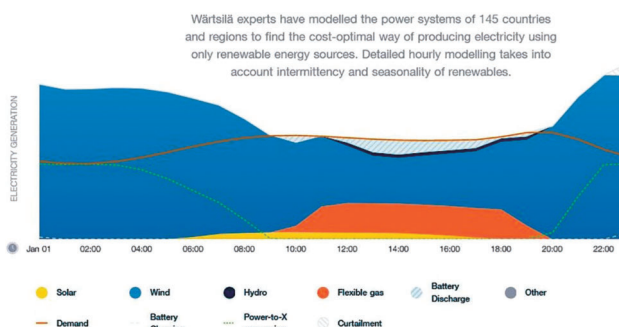
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G20 countries need over 3.5 GW of flexibility to balance renewables

To power their economies 100% with renewables, G20 countries would require 3,526 GW flexible generating assets. The capacity to balance the grid could come from 2,594 MW energy storage and 993 MW flexible gas power plants, Wärtsilä modelling shows. The Finish OEM just launched the 34SG Balancer engine capable to ramp to 10 MW in two minutes.

Wärtsilä experts have modelled the power systems of 145 countries and regions to find the cost-optimal way of producing electricity using only renewable energy sources (RES). To reach the lowest-cost 100% renewable system would require 12,900 GW of electricity production capacity across the G20 by 2030, dominated by wind and solar. However, in this case, a significant degree of "overcapacity" would have to be built to account for the variability of renewable generation.

Excess electricity supply could be utilised to produce future fuels with Power-to-X technology. Modelling by Wärtsilä researchers finds that balancing the intermittency of the renewable production with a combination of flexible gas and energy



storage would be 38% cheaper for the G20, compared to relying on energy storage alone.

"Last month's UN climate report gives a clear message for G20 leaders: to decarbonise at the lowest cost, high levels of renewable energy must be scaled up by 2030. "What we have learned from

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grew nearly 200% and totaled an all-time operational record in fourth quarter. From that total, about 2,156 MWh of new energy storage was brought online in the last three months of 2020, according to the report.

Falling technology costs and rising demand for balancing energy were the main reason for the steep surge in energy storage deployment, analysts said.

Front-of-meter storage accounted for

four of every five MW deployed in the fourth quarter of 2020, while residential storage deployment came to about 90 MW, or 14% of the installed capacity during that period. ■

Manchester's first green hydrogen hub to be built near Trafford CCGT

Greater Manchester's first low carbon hydrogen hub will be at the Trafford Low Carbon Energy Park, which includes a 250 MWh liquid-air based energy storage as well as the 1,650 MW Trafford combined-cycle gas power station. Manchester aspires to become the first Net Zero region in the world by 2040.

The Carlton Power-led hydrogen project comes after the UK Government set out its 10-point plan for a green revolution and included hydrogen and fuel cell technology. The hydrogen hub aims to store regionally produced wind and solar power in the form of hydrogen, and transport where it is needed.

Funding will come partly from a £4 million research facility from Manchester Metropolitan University, dedicated to the development of renewable energy through re-

search in hydrogen and fuel cell technology.

Carbon-neutral targeted by 2038

"The question of how we generate, transport, and use energy is absolutely fundamental to addressing the climate emergency, and this hydrogen hub is one of the ways we're answering that question here in Greater Manchester," commented Andrew Western, GMCA lead for the Green City-Region.

"We need an urgent and significant in-

crease in more renewable energy sources to cut emissions and meet our target of becoming carbon neutral by 2038. Greater Manchester's hydrogen hub, in his view, "has the potential to set the standard for decarbonised energy generation across the North West."

Businesses will be

offered the opportunity to connect with researchers and experts from the new micro-cluster at Trafford Low Carbon Energy Park.

Keith Clarke, CEO of Carlton Power said the "unique facility" will help on the path to Net Zero by 2040. "It is critical that projects such as this are brought forward to enable investment by local companies in the infrastructure to enable reduction in the carbon emissions associated with their operations," he underlined.

Cadent Gas, another project partner, will bring additional expertise as the company is already developing the UK's first hydrogen pipeline which will transport hydrogen through the UK's national gas grid. Electricity North West, meanwhile, will consult developers on how to best utilize wind and solar power from the regional electricity network while keeping the grid in balance.

Next steps for the project include identifying businesses that could potentially use hydrogen in their operations, notably those which can use the green fuel for transport or for heating. ■



Site view of the Trafford Low Carbon Energy Park

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modelling over 145 countries and regions in our Atlas of 100% Renewable Energy is that power systems with high levels of renew-

ables need a significant amount of flexibility, through energy storage and gas balancing technology, to fully decarbonise," said Sushil Purohit, President, Wärtsilä Energy.

34SG Balancer engine

Wärtsilä's grid balancing technology consists of power plants, energy storage and energy management systems. Flexible plants are powered by the Wärtsilä 34SG Balancer engine which has been optimised for renewable baseload markets. The fast-starting gas engine can ramp up to 10.8 MW in two minutes and can be operated in an unmanned standby mode to be dispatched if and when needed.

In terms of fuel, Wärtsilä engines can currently run on natural gas, biogas, synthetic methane or hydrogen blends. The company is actively developing the combustion process to allow the burning of

100% hydrogen and other future fuels.

Alongside the power plant solution, Wärtsilä offers its fully integrated GridSolv energy storage technology, as well as its GEMS digital energy platform that optimises the system through frequency regulation.

Low visibility for investment

Acknowledging the industry is in a challenging situation, Wärtsilä's VP for Technology & Product Management Jukka Lehtonen said. "Investments need to be made today even if visibility of the future is not fully clear.

"We have developed, a solution based on proven technology which (...) can be adapted to different operational profiles and running hours, along with evolving needs of the system," he said. "Using our solution, renewables can be integrated seamlessly into different energy mixes as they become available." ■

Gas to Power Journal

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PIPP secures financing for 1.2 GW combined-cycle plant in Malaysia

Indah Power Plant (PIPP) has secured financing of up to 2.7 billion Malaysian Ringgit (US\$650m) to build a 1,200 MW combined-cycle power plant on Pulau Island, Selangor. The funds will come from Bank Pembangunan Malaysia, Maybank Islamic and United Overseas Bank, with the CCGT scheduled for commissioning in early 2024.

Korea Electric Power Corp. (KEPCO) will develop the CCGT in cooperation with Tadmax, a Malaysian real estate developer under which KEPCO will obtain a 25% stake in the project. The greenfield project is situated on the island of Pulau in Selangor, situated about 60 kilometers southwest of Kuala Lumpur, the capital of Malaysia.

Construction to start this summer

Total development and construction works are estimated to amount to 3.3 billion Malaysian Ringgit (US\$800bn). Construction of the power plant will begin in the coming months, with a view to start full commercial operation in January 2024.

KEPCO in August 2020 signed a contract to sell the plant's entire electricity output to Tenaga Nasional Berhad (TNB) of Malaysia. "Electricity produced by the plant will be

sold to TNB for the next 21 years, and KEPCO has secured a total of US\$2.9 billion in power sales during the project period," a KEPCO official explained.

"Once it is commissioned in January 2024, the power plant is expected to support the increasing power demand in the Klang Valley and boost the baseload supply for the region," said Worldwide Holdings and PIPP chairman Datuk Nor Azmie Diron. Worldwide Holdings is the majority shareholder in PIPP with a 75% stake and the remaining 25% stake is owned by Korea Electric.



ACWA signs financing deal for \$1bn gas power project in Uzbekistan

Saudi Arabia's ACWA Power has secured \$750 million in senior debt to develop the Sirdarya combined-cycle power plant in Uzbekistan. Built at a cost of \$1.2 billion, the 1,500 MW Sirdarya CCGT is designed to meet 15% of the country's electricity needs and will account for 8% installed capacity.

The Bank of China, European Bank for Reconstruction and Development (EBRD), German Investment Corp (DEG), Standard Chartered, Natixis, Société Générale and the OPEC Fund helped to structure the finance deal.

Considering the current macroeconomic climate, the closure of a public-private partnership (PPP) for the Sirdarya project highlights ACWA Power's ability to arrange structured finance agreements. Rajit Nanda, Chief Investment Officer (CIO) of ACWA Power said his team was "delighted with the

timely signing of a financing package for the Sirdarya CCGT project, which enables us to support the Republic of Uzbekistan in providing cost-effective and energy-efficient power solutions for their industry and residential communities.

Under a contract with the Uzbek energy ministry, ACWA Power has been designing and delivering the three projects – Sirdarya and two wind farms – to help meet Uzbekistan's rising electricity demand that is forecast to reach 110 billion kWh by 2030.

"The successful financial closure of Sirdarya project in a challenging operating environment validates continued appetite for PPPs and green investments. It also reflects the confidence and credibility of ACWA Power," the company's President and CEO Paddy Padmanathan said.

Once fully operational, the large gas power plant will provide cleaner, more efficient and cost-competitive electricity than most coal-fired power plants in Uzbekistan.



Render of the 1.5 GW Sirdarya gas power project

AD ESM co-finances LNG-to-Power project in northern Greece

AD Power Plants of Northern Macedonia (AD ESM) has agreed to take a 25% stake in Alexandroupolis Electricity Production, the special purpose vehicle set up to finance, build, own and operate a power plant in northern Greece. The project, currently fully owned by DAMCO Energy, will have a capacity of 662 MW initially and is scheduled to start operation 2023.

The regional government of North Macedonia also committed to investment €380 million in the combined-cycle power plant project and spend a further €370 million to buy a 10% stake in a LNG regasification terminal that is planned to be built and commissioned in 2023 – in time to source LNG for the new power project.

The CCGT unit is currently licensed for a capacity of 662 MW which is meant to be expanded to about 800 MW at a later stage.

Gas supply deal & long-term PPA

The new project partner AD ESM also signed a long-term Power Purchase Agreement (PPA) to take off its proportional 25% share of the power plant's annual electricity output. The lion's share, or 75% of the plant's power output will be offtaken by DAMCO Energy.

In this context, AD ESM will have the option to directly procure and source the natural gas that will be burnt at the Alexandroupolis power plant in order to generate its allotted power output. Hence, the agreement will give ESM a fully integrated energy supply chain, allowing it to hedge and forward-buy and sell natural gas and electricity on Greek's wholesale energy market.

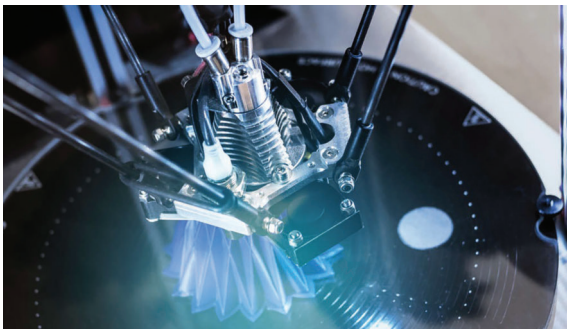
Alexandroupolis LNG terminal

The city of Alexandroupolis on April 1, 2021, signed three memoranda with the Greek federal government to source regasified LNG from the planned terminal in town. The aim is to convert region's existing coal-fired generators to natural gas, but also to secure feedgas for the new Alexandroupolis power project, developed by DAMCO.

DNV launches new 3D-Printing service specification

Norwegian classification society DNV has released a new service specification document for Additive manufacturing (AM), which uses 3D model data to fabricate parts in a shorter time and at a lower cost than traditional engineering practises. The new service specification, DNVGL-SE-0568, is meant to build trust in 3D-printed parts.

The DNVGL-SE-0568 code is part of 6 different AM-related standards and recommended practices for the oil & gas and offshore industries. It now is the basis for obtaining DNV certificates and endorsements digital products and services, qualification of manufacturers, build processes, parts and part families, AM machine(s) and equipment and personnel.



Close-up view of the 3D-Printing process

Brice le-Gallo, regional director energy systems, APAC at the Global Additive Manufacturing Center said DNV's new service specification would provide the AM with assurance that equipment for manufacturing printed parts meet a high standards of quality and integrity supply chain. "To enable widespread AM use, there needs to be a greater level of confidence in the products required in its ongoing use," he said.

Having investigated 3D-printing since 2014, the classification society in 2017 published the first guideline for the use of additive manufacturing in the maritime and oil & gas industries. A year later, DNV opened a Global AM Centre of Excellence in Singapore which is supported by the Singapore Economic Development Board (EDB), to serve as an incubator and test

bed for research and development in AM technology for the oil and gas, offshore and maritime sectors.

On 1 March 2021, the Norwegian-German classification society DNV GL has changed its name to DNV after a comprehensive strategic review. The previous name had been in place since the 2013 merger between DNV (Det Norske Veritas) and GL (Germanischer Lloyd), and CEO Remi Eriksen said the name simplification would show the successful completion of the merger.

As of February 1, the Oslo-based group also combined its Oil & Gas and Power & Renewables business. The new 'Energy Systems' unit employs over 4,000 experts and provides certification, advisory and digital monitoring services. By combining its expertise, DNV GL said it is "better equipped to support clients in tackling the energy transition."

Siemens' reactive power compensator advances RES in California

Reactive power compensation helps Los Angeles Department of Water and Power (LADWP) integrate rising volumes of intermittent renewable energy into the grid. A new reactive power plant, supplied by Siemens Energy, will combine static synchronous compensation (STATCOM) technology and a modular multilevel converter (MMC) to enhance the functionality of LADWP's Barren Ridge Switching Station.

The new ± 200 megavolt ampere (MVar) SVC PLUS will provide the necessary voltage support needed in the Barren Ridge area, where LADWP has significantly increased the output of solar power. Commissioning of the plant is planned for summer 2022 – after an execution time of only 16 months.

The Barren Ridge Switching Station is situated in Kern County, adjacent to a 78 MW solar power project also known as the RE Cinco project which produces enough clean electricity for more than 25,000 homes. LADWP is purchasing this electricity under a long-term power purchase agreement.

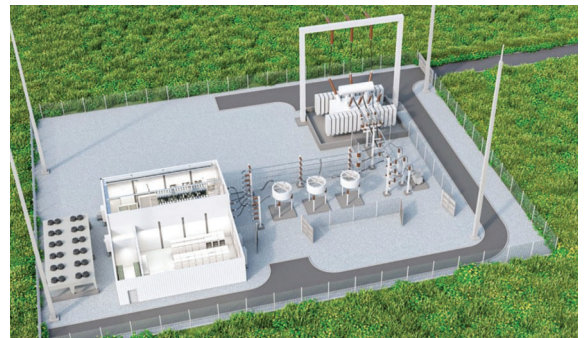
"Constantly increasing the share of CO₂-free, climate-neutral electricity in our grid is one of our most important challenges," said Reiko Kerr responsible for Power System Engineering and Technical Services at LADWP. "In addition to building new wind and solar power plants, targeted investments in our electricity transmission infrastructure are crucial to achieving our renewable energy goals. Barren Ridge will provide long-term grid stability for our customers while supporting increasing amounts of renewable energy in our portfolio."

Balancing RES and industrial demand swings

Voltage fluctuations are becoming more frequent these days due to different factors, e.g. volatile electricity infeed from renewable energy sources (RES) or the sudden connection and disconnection of energy-intensive industrial plants.

Many large fossil-fuelled power plants, which used to provide the necessary reactive power to compensate these fluctuations, are leaving the grid amid increasingly stringent emissions rules. Responding to the global decarbonisation trend, grid operators around the world are responding by building STATCOM systems.

Siemens Energy SVC PLUS is an advanced STATCOM, a solution for voltage regulation in the power grid. Explaining the technology behind the reactive power compensator, Siemens Energy VP Transmission, Beatrix Natter said STATCOM's fast response system stabilizes the transmission grid in the event of sudden changes to the infeed of wind, solar or hydro generation changes. MMC, meanwhile, allows to implement this complex technology in a very small footprint.



Render of SVC PLUS, a Siemens-built solution for voltage regulation.

Three-phase step-down transformers

The heart of the SVC PLUS will be two three-phase step-down transformers with 230-kilovolt (kV) and 200-MVA capacity and an industrial-class insulated gate bipolar transistors (IGBT) based converter, Siemens Energy pointed out.

Ultimately, the reactive power compensation plant at Barren Ridge will support LADWP's ongoing power grid build-out and improve the robustness of the overall system. In addition to the plant, Siemens Energy will provide extended warranty to maximize its availability and operating flexibility.



Six US utilities add EV fast chargers to link Atlantic with Gulf Coast

The Electric Highway Coalition – made up of American Electric Power, Dominion, Duke Energy, Entergy, Southern Co., and the Tennessee Valley Authority – plan to establish a network of electric vehicle (EV) charging stations to enable seamless travel between Gulf Coast, Midwest and Atlantic State destinations. Over 18 million EVs are estimated to be on US roads by 2030.

Though a rising number of drivers embrace EVs, many are concerned with the availability of charging stations during long road trips. With efforts like the Electric Highway Coalition, electric companies are demonstrating to customers that EVs are a smart choice for driving around town, as well as traveling long distances.

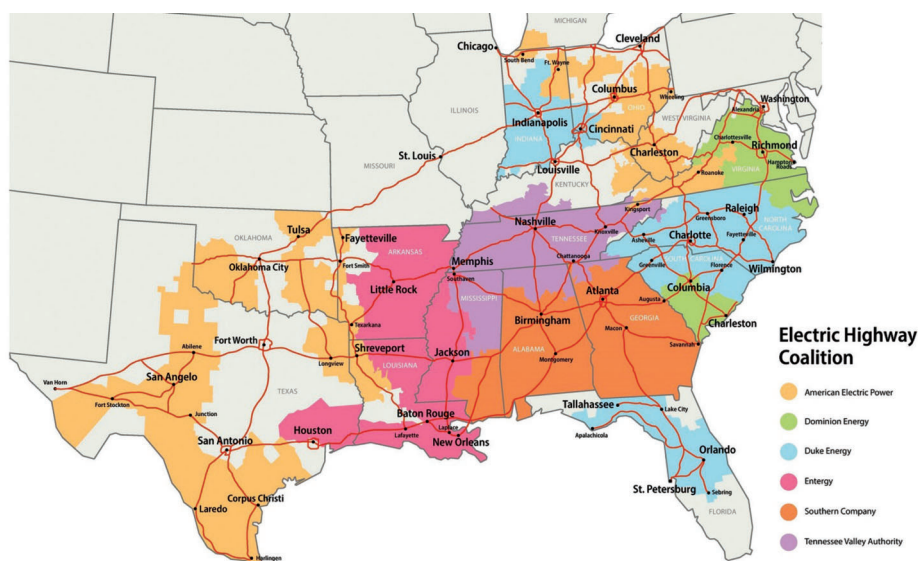
Sites along major highway routes are being considered with a view to determine final charging station locations. Charging stations will provide DC fast chargers that are capable of getting drivers back on the road in approximately 20-30 minutes.

"Dominion Energy is committed to equitable and reliable charging access so our customers may experience the benefits of electric transportation, including reduced carbon emissions," CEO Robert M. Blue said.

Transportation is the largest source of carbon emissions in the United States. Electrification plays a vital role in reducing emissions and improving air quality, hence Dominion is supporting the EV adoption through a range of measures:

The Smart Charging Infrastructure Pilot Program supports EV adoption in Virginia, while electric transit buses in South Carolina and Virginia will be powered by Dominion Energy through partnerships with the Charleston Area Regional Transportation Authority (CARTA) and Hampton Roads Transit.

Virginia customers who have smart meters will be eligible to enroll in a newly approved time-varying rate that will give them more control over their electric bill. The rate incentivizes customers to do certain tasks – such as charge their electric vehicle – at times of the day when demand for electricity is low.



US shale industry returns to positive cash flows after slashing Capex

A cross-section of 30 US shale oil and gas producers found the industry have enjoyed the first full year of positive free cash flows since the fracking boom began. Energy Economics and Financial Analysis (IEEFA) found the 30 producers generated \$1.8 billion in free cash flows in 2020 after slashing capital spending by \$20 billion.

“Last year’s positive free cash flows were only possible because shale companies cut their capital spending to the lowest level in more than a decade,” said Clark Williams-Derry, IEEFA energy finance analyst and co-author of the report. “Restraining capital spending could help the fracking sector generate cash, but low lev-

els of investment also undermine the industry’s prospects for growth.”

Free cash flow is defined as the amount of cash generated by a company’s core business, minus its capital spending. Since 2010, the 30 companies examined by IEEFA had reported negative free cash flows totaling \$158 billion.

2020 was a difficult time for the oil industry, as the global coronavirus pandemic pummelled the sector with falling demand, low prices and a wave of bankruptcies. The 30 producers responded by slashing capital spending to \$28.8 billion, a 41 percent cut from the 2019 figure of \$48.9

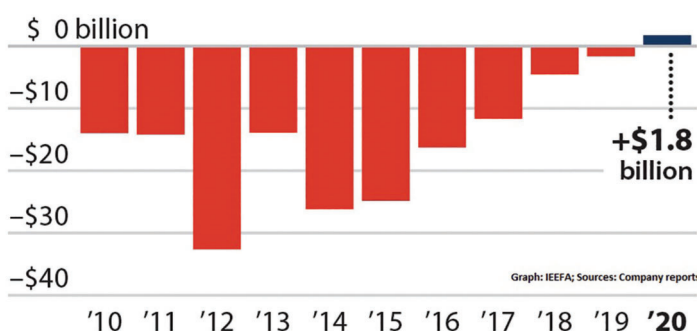
billion. Capex reductions, which started in mid-2018, have helped the companies report positive free cash flows during five of the preceding seven quarters.

“Despite this turnaround, a decade of dismal financial performance casts a shadow over the industry,” said Trey Cowan, IEEFA oil and gas industry analyst. “The positive free cash flows pale in comparison to the industry’s accumulated debt loads.”

The 30 shale producers owe almost \$90 billion in long-term debt, and the reductions in capital expenditures are unlikely to ensure that the industry grows. U.S. oil production plunged last year by 332 million barrels, the largest one-year drop in history.

“Oil and gas producers face a dilemma,” said commented IEEFA fellow Ashish Solanki. “Keeping capital spending in check could improve the industry’s cash performance. Yet falling investment will also constrain production.”

Free Cash Flow at 30 Shale-Focused Firms





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Mitsubishi wins £75m bid to turn UK Humber region to hydrogen

Mitsubishi, part of the Zero Carbon Humber (ZCH) Partnership, has won a £75 million (\$103 million) government contract to help decarbonise the region by 2040. Locally produced hydrogen will be distributed by a shared pipeline network, carrying green hydrogen to industrial customers, local utilities and fed into Centrica's gas storage facility at Easington.

Carbon capture, removal and storage (CCS) technology will be used to create low-carbon hydrogen, which will be carried via pipeline to industrial customers and power generators. Any surplus hydrogen supply will be transported into storage at an off-shore aquifer in the UK's southern North Sea.

Drax Group, SSE Thermal and Uniper – three of Britain's largest power producers – are part of the ZCH Partnership together with Associated British Ports, British Steel, Centrica Storage, Equinor, Mitsubishi Power, National Grid, px Group, Saltend Cogeneration Company and the University of Sheffield Advanced Manufacturing Research Centre (AMRC).

Creating the world's largest hydrogen plant

ZCH bid's anchor project is the Equinor-led Hydrogen to Humber (H2H) Saltend proposal, which will establish the world's largest hydrogen production plant with carbon capture on the Humber's north bank.

H2H Saltend will convert natural gas to hydrogen and capture the CO₂ in the process. In the first phase, this could reduce emissions by circa 900,000 tonnes per year as industrial customers at px Group's Saltend Chemicals Park switch fuel to low-carbon hydrogen while Triton Power's gas power plant blends hydrogen into the fuel supply of its converted Mitsubishi Power turbines. H2H Saltend is expected to grow over

time, contributing to further emissions reductions from the Chemicals Park and across the Humber.

A pipeline network, developed by National Grid, will link H2H Saltend to energy-intensive industrial sites throughout the region, to enable further decarbonisation from projects across the Humber through the capture of at least 17 million tonnes of CO₂ emissions per year and the supply of up to 10 gigawatts (GW) of hydrogen by the mid-2030s. The CO₂ will be compressed at Centrica Storage's Easington site and stored under the Southern North Sea using off-shore infrastructure developed by NEP (in which Equinor and National Grid are two of the partners) and shared with NZT (in which Equinor is a partner).

Part of the green hydrogen will be used for power generation, with Mitsubishi striving to retrofit the turbines of existing power units to also run on the clean fuel. "Converting combined-cycle gas turbines to run on hydrogen will lead to a deep decarbonisation of the power sector, while ensuring the UK retains a stable, reliable and flexible power supply and can achieve its Net-Zero goal," CEO Mitsubishi Power Europe CEO, Carlos Gonzalez Peton commented.

FID on construction slated for 2023

"The matched funding to ZCH covers obtaining land rights, development consents and front-end engineering design for H2H Saltend and the onshore pipeline infrastruc-

ture for CO₂ and hydrogen," project partners said. The funding will allow the scheme move towards a final investment decision (FID) on construction during 2023, with H2H Saltend and associated infrastructure expected to come online around 2026.

Developers underlined the Zero Carbon Humber (ZCH) alone could reduce the UK's annual emissions by 15% and safeguard 55,000 existing jobs in the region. A shift to clean hydrogen is also hoped to "secure the future for the Humber's traditional heavy industry and related supply chains."

Net Zero Teesside and the Northern Endurance Partnership said they have made separate bids to the same UK Government fund, though the companies are closely aligned due to their shared offshore infrastructure and storage assets. ■

NEWS NUDGES

Toshiba recycles CO₂ into carbon monoxide

Toshiba has developed the world's most efficient electro-catalyst technology for converting CO₂ into carbon monoxide (CO), a raw material for fuel and chemicals. The electro-catalyst has the size of a C5 envelope, operates at room temperature, and can process up to 1 ton of CO₂ a year.

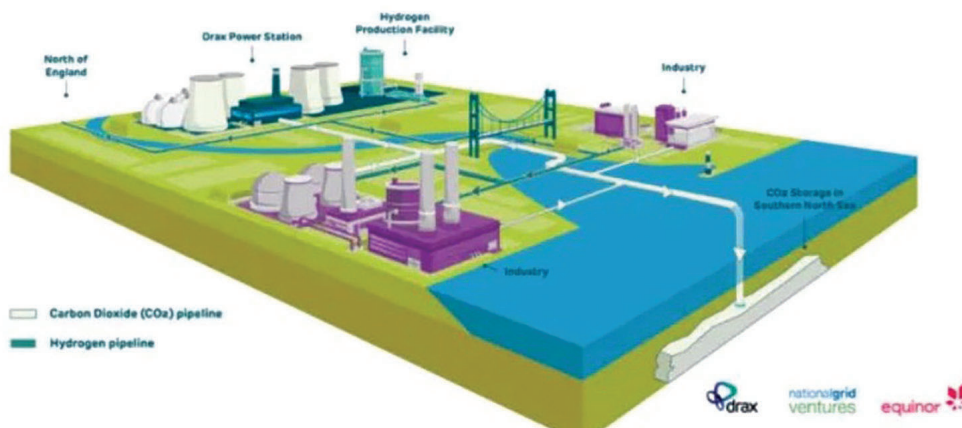
ADM develops Barracuda oil and gas field

ADM Energy has agreed to invest up to US\$1.3 million in developing the Barracuda oil and gas condensate field by acquiring a 51% interest in K.O.N.H. UK. Named OML 141, the field is situated in shallow waters offshore Nigeria. Developers said they intend to provide or procure funding in return for 235% of approved Capex to be recovered plus a 15% net profit interest (NPI) from the field.

Wärtsilä services engines at NYK's LNG carriers

Japan-based NYK LNG Ship Management has awarded Wärtsilä two long-term Optimised Maintenance agreement. The 15-year contracts cover Wärtsilä's 50DF dual-fuel engines and other equipment installed on two LNG carrier vessels. The deal took effect from January 2021. ■

WHAT A ZERO CARBON CLUSTER COULD LOOK LIKE IN THE HUMBER REGION



KARMOL's first LNG-to-Power FSRU to be deployed in Senegal

KARMOL, a joint venture between Karpowership and Mitsui OSK Lines, has taken delivery of first LNG-to-Power floating storage and regasification unit (FSRU) which is currently undergoing sea trials before being deployed in Senegal. The converted Dwiputra, now named KARMOL LNGT Powership Africa, will supply LNG-powered electricity to the West African country.

In Senegal, the Turkish company Karpowership is already operating a 235 MW powership since August 2019 which covers around 15% of the country's electricity needs. The first LNG-fuelled FSRU, operated by KARLMOL, will help the Powership switch to running on LNG before the end of June.

According to LNG Journal's ship tracker,

the vessel left Sembcorp Marine yard in Singapore on March 14 and took on a cool-down cargo at Singapore LNG on Friday, March 19. It has since been anchored at Singapore's Gusong anchorage for testing.

Kensuke Ito, the KARMOL representative at the FSRU launch event in Singapore said: "The vessel symbolizes MOL and Karpowership's continued partnership and represents

our strong commitment to providing LNG-to-Power solutions to the African region."

Technically speaking, KARMOL's unique technique of regasifying LNG onboard a specially designed FSRU for direct use in a Karpowership will accelerate the roll-out of LNG-to-Power projects in countries with no domestic gas resources.

The Turkish-Japanese joint venture company announced plans to convert its entire fleet of Powerships to LNG. To that end, the JV already has another FSRU under construction which will be released shortly and is destined to be deployed offshore Mozambique.

KARMOL board member Gokhan Kocak said the company has a "bold ambition to offer LNG to Power across the world and especially within Africa." He explained that the "usage of FSRUs mean we can unlock the benefits of clean and affordable electricity for millions of people, even where countries have no domestic gas production or infrastructure."



FSRU 'Karmol LNGT Powership Africa'

Vattenfall, Siemens trial solution for green district heating in Berlin

Vattenfall Wärme and Siemens Energy have agreed to demonstrate and trial a large high-temperature heat pump (8 MW) at Vattenfall's cooling plant at Berlin Potsdamer Platz. Known as the Qwark³ project, it will generate green district heating using waste heat and electricity from renewables, and feed it into Berlin's district heating network.

The Siemens Energy-built 8 MW heat pump will be capable of flexibly delivering flow temperatures in the district heating network of between 85°C and about 120°C. Developers pointed out the project will be the first trial of the large, high-temperature heat pump at a practical scale under real-life conditions.

The cooling plant at Potsdamer Platz, where the heat pump trials will take place, has been in operation since 1997. Throughout the years, it has been supplying locally and efficiently generated cooling power to some 12,000 offices and 1,000 housing units nearby. Previously, the plant also generated unused waste heat, which Vattenfall had to dissipate into the surrounding air via cooling towers.

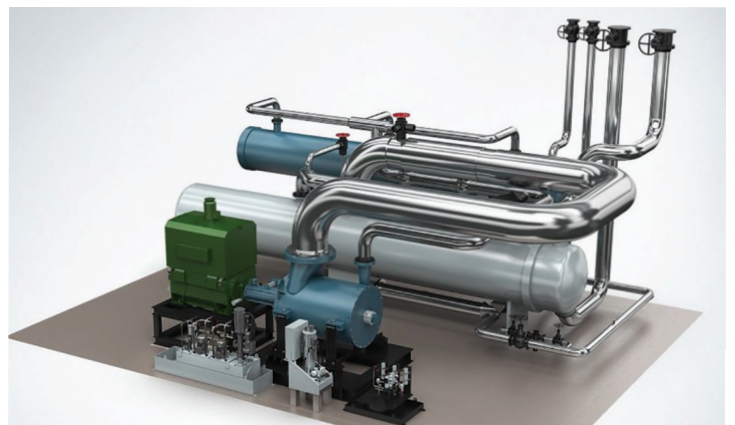
Putting a new high-temperature heat pump into operation will link heating, cooling, and electricity in a more environmentally-friendly way. It turns waste heat into a usable product which improves the energy-efficiency of the cooling power generation

process, and also significantly lowers the amount of heat being dissipated into the air. This boosts the heat in-feed into Berlin's district heating network by about 55 GWh per year, saving about 6,500 metric tons of CO₂ emissions and 120,000 cubic metres of cooling water.

"If we want to achieve the transition to a

new energy mix in the cities and rely more on the potential of renewables, we need to take an integrated view of heating, cooling, and the electricity supply. That's the only way we can make the best possible use of the available resources," said Tanja Wielgoss, CEO of Vattenfall Wärme Berlin.

Jochen Eickholt, Siemens Energy board member pointed out large-scale heat pumps can play an important part in conversion of Germany's heating supply system. Vattenfall is first to advance this heating transition in Berlin by facilitating trial runs of what he calls "potentially key technology for the first time."



A heat pump of similar configuration will be integrated into Vattenfalls' refrigeration plant at Potsdamer Platz

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