



Role of gas 'critical issue' as Germany hesitates to end fossil fuel funding

The future role gas in the power sector is keeping the German government from signing a pledge at the COP26 Climate Summit in Glasgow to end foreign fossil fuel funding by 2022. Permitted projects need to be consistent with a 1.5°C warming limit which basically means CCS/CCU [carbon capture and storage or utilisation] and hydrogen-based ventures.

Jochen Flasbarth, German state environment secretary criticised the pledge still lacks a clear definition of exceptions but the text of the pledge clearly states that signatories will have to end new direct public support for unabated fossil fuel projects globally by the end of 2022, except for projects that are consistent with a 1.5°C warming limit and the goals of the Paris Agreement.

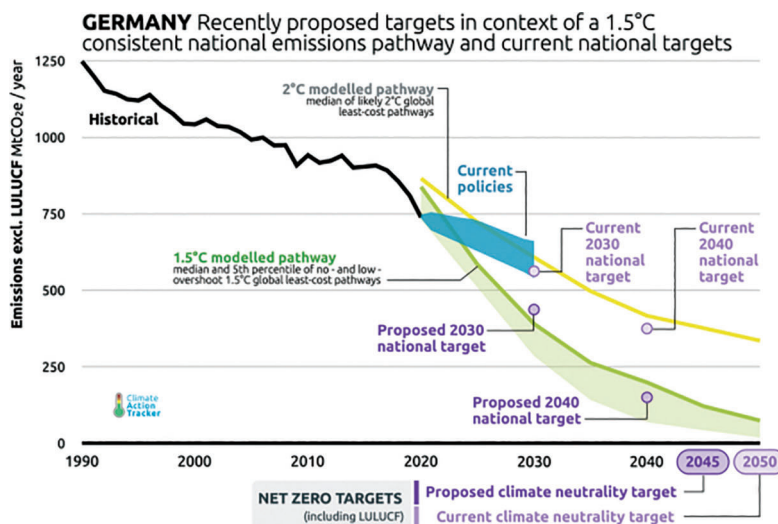
"This is basically CCS/CCU [carbon capture and storage or utilisation]," Flasbarth said, "but it can also mean H2-ready gas infrastructure, though this is on clearly stated in the text. Germany's state-owned development bank KfW, has freed up funding for sev-

eral large-scale projects aimed at improving the efficiency of existing natural gas infrastructure, including gas-fired power stations.

KfW funding for gas-based projects

Berlin wants these projects to be "made possible" even if the government signed on to the COP26 pledge to end fossil fired funding. According to Flasbarth, Germany would have a basis to sign the pledge once a common understanding was reached with

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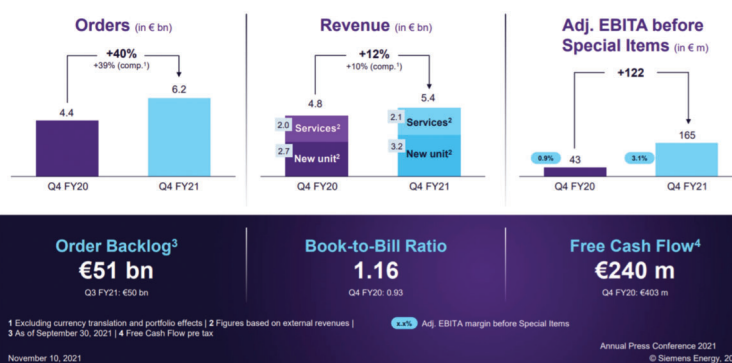


Siemens Energy revenue up in fiscal 2021, order backlog at €83.8 billion

Siemens Energy has increased its revenue in its first fiscal year as an independent company. Though orders fell 2.9% year-on-year, earnings in fiscal 2021 improved significantly to €661 million, up from a €17 million loss a year earlier. Siemens Energy CEO Christian Bruch said this was mainly due to operating improvements in the Gas and Power segment.

"I am particularly pleased with our progress in the Gas and Power segment where we improved our operational profitability," Bruch said when presenting the company's first full-year results. Orders surged 30.2% in the fourth quarter to € 9.1 billion year-over-year, largely due to large orders such as for the SuedLink grid expansion project, designed to bring wind energy from northern to south-

Gas and Power at a glance Q4 FY21



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regards to what the government deems necessary for climate action.

"If that is not possible at this stage, then we have to postpone it from the German side," he said, noting there are other countries like France and the Netherlands who also have not yet signed on.

Earlier coal exit on the cards

In light of several fossil fuel phase-out pledges at the COP26 climate summit, re-

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In light of several fossil fuel phase-out pledges at the COP26 climate summit, researchers have pointed out that Germany's planned 2038 coal exit date is "far from ambitious enough" and called on the next government coalition to pull it forward.

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FDP head Christian Lindner, Green Party leader Annalena Bärbock and SPD head Olaf Scholz

searchers have pointed out that Germany's planned 2038 coal exit date is "far from ambitious enough" and called on the next

government coalition to pull it forward.

However, the German chancellor in-waiting Olaf Scholz (SPD) repeatedly stressed the need to build new gas-fired power plants to complement renewables as the country seeks to transition to climate neutrality.

The COP26 Climate Summit in Glasgow has highlighted the dependency of Germany's energy policy on fossil fuels, particularly thermal coal and natural gas. Though the newly instated coalition government (SPD/Green Party) seeks to exit coal already by 2030, some eight years earlier than planned, natural gas will continue to play an important role as a "transition fuel".

The imminent start up of Nord Stream 2, the second leg of the Russian gas interconnector through the Baltic Sea, is widely believed to strengthen the role of gas in the German energy mix for years to come. ■

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ern Germany and the 1,100 MW Sun Ba combined-cycle gas turbine power plant in Taiwan.

The fourth quarter was the strongest – both for the company's grid solutions and power generation – with revenue increasing by 7.4% to €8.2 billion. The service business also proved to be "resilient and profitable". However, adjusted EBITA before Special

Items at Siemens Energy was negative at €46 million, mainly due to a loss at Siemens Gamesa Renewable Energy (SGRE), which could not be offset despite a strong operating improvement at Gas and Power.

Siemens Gamesa still loss-making

Losses at Siemens Gamesa Renewable Energy incurred a net loss of €560 million at the end of fiscal 2021, though the Siemens CEO said "this was a significant improvement compared to the prior year's net loss of around €1.9 billion."

"We posted a net loss primarily due to the planned restructuring measures and the known problems in the onshore business of Siemens Gamesa Renewable Energy," Bruch explained. "Looking forward, we will continue to focus on our plan to increase profitability which puts us on track to achieve our mid-term targets."

Restructuring underway

Since February, Siemens Energy has been pushing through measures to improve its competitiveness, which already show some impact. Purchasing activities were bun-

dled and parts of production optimized, and additional savings have been made with regards to material and personnel costs.

Adjusted EBITA almost reached breakeven with a loss of €12 million. In fiscal year 2020 the loss was still around €1.5 billion, caused by restructuring and non-recurring costs, portfolio-related impairments and write-downs.

Free cash flow before tax increased by 39.1% to around €1.36 billion, and in light of this positive development Siemens Energy intends to pay a dividend of €0.10 per share to the Annual General Meeting.

The spin-off of Siemens Energy from Siemens AG was enacted in September 2020 and the new company was admitted to the MDax, and on March 22, 2021, and later also became part of DAX. The company's focus lies on the strategic areas of "low- or zero-emission power generation", "transportation and storage of energy," and "reducing CO2 emissions and energy consumption in industrial processes."

Headquartered in Berlin, Siemens Energy employs a total of 91,000 people and operates in more than 90 countries. ■

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Tapping working gas volume could free up 15 bcm for European market

European gas storage is just 75% full going into November, at an estimated 83 billion cubic metres (bcm) or 14 bcm below five-year average. Unless more Russian gas becomes available via Nord Stream 2, a cold winter could leave storage empty by the end of March 2022. But tapping working gas volumes may free up 15 bcm, analysts reckon.

Beyond the nameplate working gas volume (WGV) there is an amount of cushion gas in all storage facilities, said Graham Freedman, principal analyst, Europe gas research at Wood Mackenzie.

"This 'cushion' maintains supply pressure and helps retain the physical characteristics of the field or salt cavity used for storage. In salt cavities typically 30% of the total capacity is given over to cushion gas, while around 55% of the total capacity is given over to cushion gas in depleted fields," he explained.

Operational risk

Under normal circumstances cushion gas cannot be withdrawn and considered as part of the working gas volume (WGV), he underlined. This is because the gas is owned by the storage operator which cannot sell gas under existing regulations. "There is a risk that using cushion gas could have a long-term detrimental effect on a storage site's future performance," Freedman warned.

Reducing the gas volume in any storage facility increases stress on compressors and may affect the physical capabilities of the storage site in future. But with the level of concern that there is in the market and the accompanying exceptionally high prices, these are not normal times.

"Should working gas volumes (WGV) go close to zero, governments might need to concede on regulations if they are going to keep the heating on," he warned. Storage

operators will need to consider the technical tolerance that they are prepared to accept in order to make some cushion gas available.

"We understand it is possible to use up to 10% of the cushion gas - or quasi-working gas as it is sometimes known - within the engineering tolerances of each facility. The rate of withdrawals will fall significantly as the pressure drops, but our understanding is that the use of cushion gas up to 10% will not permanently damage the physical capability of the storage site in future," Freedman said. "If 10% of the cushion gas was made available as quasi-working gas, this would represent 15 bcm of additional supply, enough to make up for the shortfall in storage at the beginning of the winter. It would help to calm markets and give greater confidence that supplies will be sufficient to get through the winter."

Commercial opportunity

And with the current high prices at European hubs, it will be tempting for storage operators to use some of their quasi-working gas this winter, replacing the volumes once prices fall in the summer. Based on the forward curve for TTF for 3 November, there is a difference in price of €28/MWh between Q1 22 and summer 22. According to Wood Mackenzie calculations, this equates to a gross margin of €310 million (\$360 million) for each billion cubic metres of quasi-working gas that is released from storage during Q1 22 and replaced during summer 22.

"This is a commercial opportunity that

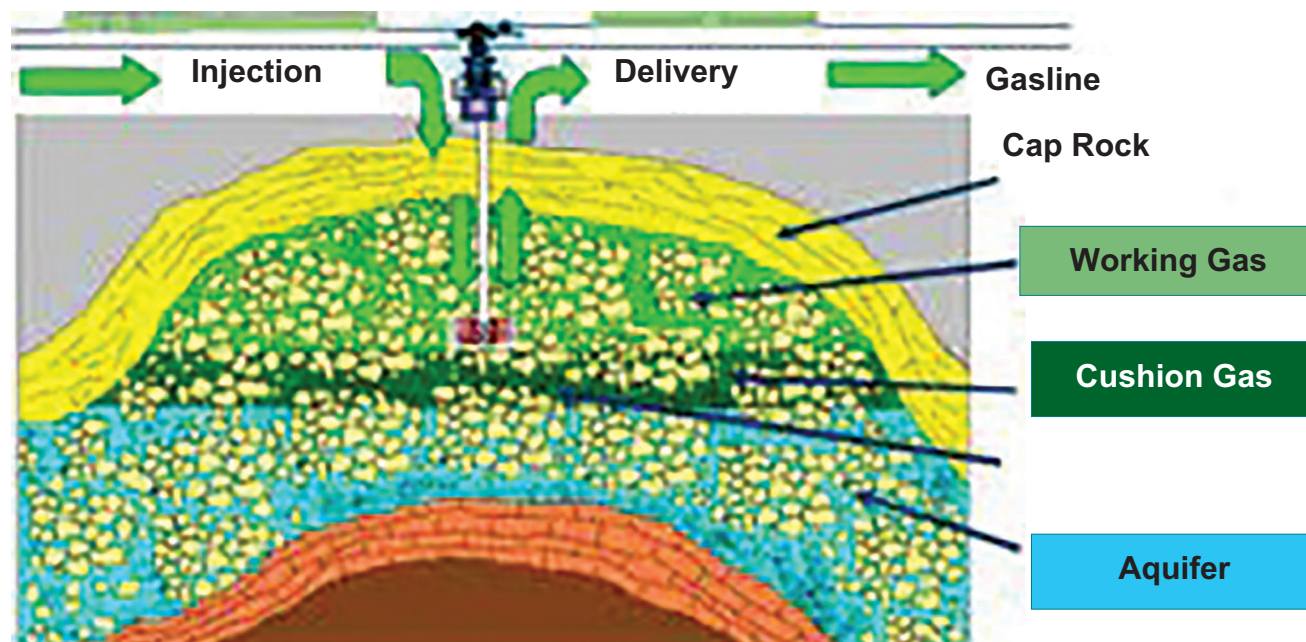
could be hedged in the forward market," Freedman underlined.

In countries like France and Belgium - with neither has depleted fields nor suitable geological formations to build salt caverns - aquifers are the preferred method of storing large volumes of gas. In such aquifers, around 75% of total gas stored is so-called cushion gas. According to Freedman, "that means that for every unit of working gas there is in an aquifer, there are around three units of cushion gas."

Patchy data

However, data for the volume of cushion gas as a percentage of the total gas capacity in each storage facility is "patchy at best," he said. Hence, Wood Mackenzie had to make "some assumptions" about the levels available based on its general understanding of each type of storage method: salt caverns have 30% cushion gas, depleted fields 55%, and aquifers 75%. "Our analysis suggests that there is approximately 150 bcm of cushion gas in storage across the continent at any given time. Around 95 bcm is in depleted fields, 45 bcm in aquifers, and 8 bcm in salt caverns," Freedman explained.

France, with an estimated 33 bcm, should have the greatest amount of cushion gas due to its extremely high proportion of aquifers in its storage mix, Wood Mackenzie's analysis suggests. Next comes Italy with 23 bcm in its depleted fields, followed by Germany with 18 bcm from its mixture of salt caverns and depleted fields. ■





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ACWA Power posts \$5.8 million loss in first quarterly earnings after IPO

Saudi developer ACWA Power today reported a SR21.8 million (\$5.8 million) loss in its first quarterly earnings after getting listed at the Saudi Stock Exchange Tadawul on October 11. Income from the company's O&M business increased thanks to large projects like Al Dur IWPP and Hassyan IPP.

Three projects – Sudair, Sirdarya and Redstone – completed their respective financial closes during the period, contributed into higher operating income. But this was offset by long-term lower net results of equity accounted investees, mainly due to accelerated depreciation on two oil-fired assets.

Net profits for the first nine month of 2021 fell by SR420 million, down 51% compared to the same period in 2021. According to ACWA Power, a “flat operating income”

which was reduced by the SR280 million one-of charge related to its IPO, and additional impairment charges.

Solid basis for growth

Paddy Padmanathan, CEO of ACWA Power said the results demonstrate the company is on track towards achieving our business and financial targets as set for fiscal year 2021. “This provides us with a solid basis for growth, which is our top priority following ACWA Power’s listing on the Saudi

Stock Exchange,” which was oversubscribed 250 times.

To free up some cash and lower its carbon footprint, ACWA Power divested a 32% stake in an oil-fired asset – the Shuqaiq Water and Electricity Company to NOMAC for an undisclosed amount.

Jazan IGCC to boost 2022 results

Asset acquisition and project financing agreements on the SR45 billion (\$12 billion) Jazan Integrated Gasification Combined-Cycle (IGCC) power plant were signed in September. Once fully operational, Jazan IGCC will supply power, steam, hydrogen for Aramco’s Jazan refinery, under a 25-year contract with Aramco. The large IGCC project is expected to be a “significant contributor” to ACWA Power’s financial results in 2022, the developer said.

Financial close on the 1,500 MW Sudair photovoltaic IPP was achieved in July, in partnership with the Public Investment Fund (PIF) and Saudi Aramco. And a power purchase agreement (PPA) for a 1,100 MW Wind IPP was also signed with the Egyptian government over the summer.

On the operating side, commissioning of the 300 MW first stage of 900 MW Shuaa Energy 3 PSC took place in July and the first stage of the solar park achieve full commercial production in under 12 months. ■



ACWA Power was the 5th listing on Tadawul in 2021.

Rolls-Royce customer EPG to build mtu Series 4000 engines in China

Rolls-Royce has sealed contracts for the delivery of several hundred mtu engines and power gen systems at the 4th China International Import Expo (CIIE), held in Shanghai through November 10. The customer EPG signed a letter of intent to produce 30 mtu diesel systems, based on mtu Series 4000 engines that will be built in China.

SUMEC Group, part of China National Machinery Industry Corp, plans to order mtu diesel engines as well as mtu diesel and gas gensets.

Purchasing framework agreements were also signed with XCMG for the delivery of 45 mtu Series 2000 and 10 Series 4000 engines for both mining and power gen applications. In addition, Beijing Chaotiefubang Tech Development ordered 20 mtu Series 1500 engines for use in trains – one of the first orders for these engines for the rail application.

Committed to produce in China, Rolls-Royce and MTU Yuchai Power Company agreed to continue to manufacture mtu Series 4000 engines for power generation

in the latter’s plant in Yulin, Guangxi province. MTU Yuchai Power is a joint venture between Rolls-Royce and Guangxi Yuchai machinery company.

New test bench in Suzhou

The British engineering giant Rolls-Royce has been producing mtu engines in China – Asia’s fastest growing energy market – since 2006. A new test bench at its location in Suzhou has just been opened, and with this new addition, Rolls-Royce value-chain in China now covers the entire process from R&D, manufacturing, sales and services.

“China is the most important growth market for us,” said Eugenia Valente, President, Rolls-Royce Power Solutions Greater China with reference to the company’s wide range

of customers for mtu solutions. “It proves that our investments, focus on building long-term partnerships in China and our ‘local-for-local’ approach for localization are the right strategy, benefitting both Rolls-Royce and our Chinese partners,” she said.

As a provider of integrated solutions for power and propulsion, Rolls-Royce aims to support China’s journey towards decarbonisation. In 2020, Rolls-Royce achieved total revenue of £11.76 billion and invested £1.25 billion in R&D. ■



Rolls-Royce local team at CIIE in Shanghai.

MTU launches hydrogen-ready gas engines

Rolls-Royce affiliate MTU has launched Series 500 and Series 4000 gas engines, ready for 25% hydrogen co-firing. The engines and conversion kits for 100% hydrogen operation will be available for customers from 2025.

Already today, gensets powered by MTU Series 500 and Series 4000 gas engines can be operated with a gas blending of 10% hydrogen and beginning in 2022, operation with 25% hydrogen content will be possible, the company said.

"After intensive tests on test benches and pilot installations at customers in 2022, Rolls-Royce will continuously market new mtu Series 500 and Series 4000 gas engines beginning in 2023 for use with up to 100% hydrogen," Perry Kuiper, President Sustainable Power Solutions at Rolls-Royce Power Systems said, adding: "On a design to order basis conversion kits to allow already installed gas engines in the field to fully run on hydrogen."

Rolls-Royce's Power Systems division aims to save 35% of greenhouse gas emissions by 2030, compared to 2019. A key element in achieving this target is the certification of MTU engines to run on sustainable EN 15940 fuels such as e-diesel and second-generation biofuels as early as 2023.

Supporting the energy transition

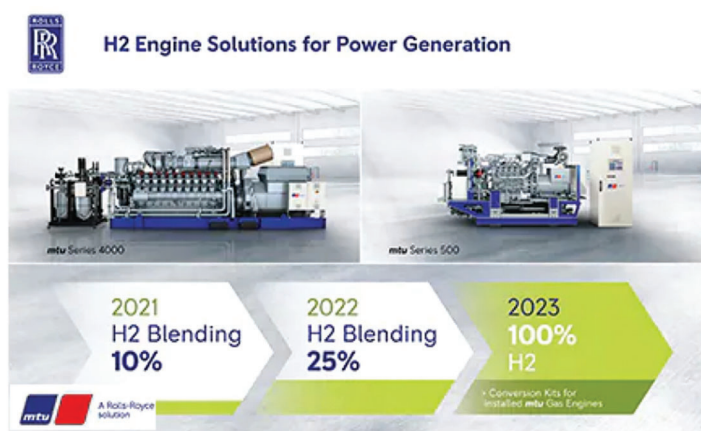
The decarbonisation of power generation requires reliable, flexible, but also climate-

neutral, power plants to supplement the fluctuating generation from wind and sun.

"We assume that natural gas will initially be the primary fuel in the development of the hydrogen ecosystem, but we see hydrogen as technically and economically possible. That is why we continue to develop our gas engines for use with green hydrogen - whether as a 10 or 25% admixture or for 100%," explained Andreas Görtz, VP Power Generation at Rolls-Royce Power Systems.

Building an H2 ecosystem

Fuel cells powered by 100% green hydrogen can play an important role in future energy supply in combination with renewables. At its Friedrichshafen headquarters, Rolls-Royce's Power Systems division has installed a 250-kilowatt (kW) fuel cell demonstrator, which will be used for testing CO2-free energy systems. The entire hydrogen ecosystem, including the infrastructure for supply, conversion, test benches and future production, is also being mapped in the company's own plants, thus building up expertise. ■



Rolls-Royce and Cellcentric develop mtu hydrogen fuel cells

Rolls-Royce's power systems business unit MTU has teamed up with Cellcentric – a joint venture set up by Daimler Truck and Volvo Group – to develop hydrogen fuel cells based on cellcentrics modules that emit nothing other than vapour. The solution can be used to generate emergency power for data centres.

Each fuel cell module will in the future deliver a net power output of around 150 kW – sufficient to power approximately 10 homes or 50 washing machines – and can be connected together into scalable fuel cell power plants with outputs in the megawatt range, capable of providing clean back up power for large data centers.

Rolls-Royce commissioned a fuel cell demonstrator earlier this year and plans to bring a further demonstrator plant on line in 2022, based on modules providing approximately 100 kW each.

Technical leap forward

Hydrogen-based fuels cell are "crucial building blocks" to achieve the goal of a CO2-neutral society, underlined Dr. Matthias Jurytko, CEO cellcentric. "With Rolls-Royce, we have an important partner at our side with whom we want to achieve further economies of scale to help the technology

achieve a breakthrough," he said.

"Electrical generators based on fuel cells represent the next leap forward in the energy transition, both for us and our customers," said Andreas Schell, CEO of Rolls-Royce Power Systems. When they run on green hydrogen, meaning hydrogen made using renewable energy sources, fuel cells are climate-neutral," Schell said announcing MTU will look into how green hy-

drogen can be produced cost-effectively in large quantities

Pilot plant in 2023

The first pilot plants with customers will be installed in 2023, with Rolls-Royce launching standard production fuel cell systems in 2025. A fuel cell module is currently on display on the Rolls-Royce stand at COP26 in Glasgow, Scotland, in special, sleekly

designed casing with a stylized 'H', the chemical symbol for hydrogen, on the front side.

Key customers for the solution will be large data center operators, as well as telcom and internet providers. ■



CellCentric and MTU executives after signing the joint development accord.

Helion raises \$500 million, aims to generate electricity from fusion by 2024

US-based clean energy firm Helion has raised \$500 million in its Series-E founding round to complete the construction of Polaris, the company's 7th-generation fusion power plant. Pulsed non-ignition fusion is the technology used at the generator, and Polaris CEO David Kirtley the aims is for the device to generate net electricity in 2024.

This funding ensures that Helion will be the first organization to generate electricity from fusion, said Dr. Kirtley who founded the company. "Our 6th prototype demonstrated that we can reach this pivotal milestone. In just a few years we will show that the world can count on fusion to be the zero-carbon energy source that we desperately need."

Heating fusion plasma

In June, Helion announced it had become the first the first private fusion company to heat a fusion plasma to 100 million degrees Celsius – a critical milestone to generate electricity commercially from fusion. This was followed by Helion breaking ground in July 2021 for the Polaris facility in Everett, Washington.

The latest funding round, led by the

activist investor Sam Altman, includes the option for an additional \$1.7 billion dollars. Existing investors, including Dustin Moskovitz, Mithril Capital and Capricorn Investment Group also participated in the round.

Mr Altman, CEO of OpenAI and former President of Y Combinator, hailed Helion's technology as "by far the most promising approach to fusion" he had ever seen. "With a tiny fraction of the money spent on other fusion efforts, and the culture of a start-up, this team has a clear path to net electricity," he said, stressing this can help avert climate disaster and provide a better quality of life for people.



Divertor of Trenta, Helion's 6th fusion generator prototype

Once commercially available at large scale, Helion's pulsed non-ignition technology will generate low-cost electricity 24/7 that replaces the fossil energy sources the world currently relies on. ■

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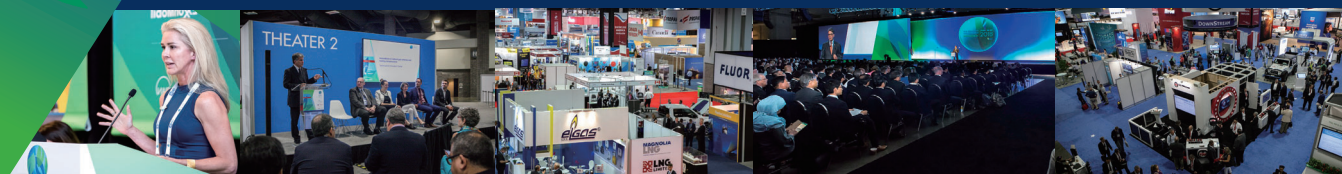


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GenCell deploys test unit of hydrogen fuel cell in Reykjavik, Iceland

Israel-based fuel cell maker GenCell has deployed a test unit of its A5 off-grid power solution to energise Emergency Communications System (ECS) station in the capital of Iceland, Reykjavik. Small-scale, sector-specific hydrogen projects are "cheaper and quicker to deploy," GenCell CEO Rami Reshef said as they provide "a great opportunity to trial and ultimately, scale solutions."

The A5 off-grid genset extracts hydrogen from liquid ammonia – one of the most effective carbon-free hydrogen carriers. It will be shipped from Israel and is expected to reach Iceland in February.

Based on alkaline fuel cell technology, GenCell's A5 unit combines the benefits of green fuel cell energy with an inexpensive and easily accessible liquid fuel – anhydrous ammonia. The patented ammonia cracking device generates hydrogen-on-demand for use by its hydrogen fuel cell generators.

Hydrogen cheaper than diesel fuel cell

A single 12-ton tank of ammonia provides enough fuel for a year of 24/7 operation. When installed at 1,000 sites or more, customers using the A5 hydrogen-fuel cell unit can save up to \$250 million compared to diesel-fuelled solutions, the GenCell CEO explained.

By extracting hydrogen from widely available liquid ammonia, the A5 solution ensures 24/7 uninterrupted power – in contrast to intermittent solar PV and wind resources that require complementary energy storage to maintain power when sunlight and wind are not available – and at a price competitive to that of diesel.

GenCell recognizes the significant market opportunity for transitioning the world's 1.2 million telecom towers to clean power – a market which has been estimated at some US\$12 billion.

Unit to start operations February 2022

The project in Reykjavik has been deployed at the ECS station of the Icelandic telecom provider Neyðarlínan ohf that operates National Emergency Number 112, the National Tetra Telecommunication Service and the Icelandic Maritime Service. GenCell ensured



Off-grid genset installed on behalf of Neyðarlínan ohf

that shipment and installation of the fuel cell will be finalised before the end of February next year.

"Here in Iceland's challenging weather conditions, we have deployed many different power solutions to ensure uninterrupted power for our networks and to transition to clean renewable energy sources," said Thorhallur Olafsson, CEO at Neydarlinan. According to GenCell, its alkaline fuel cell technology can withstand operating temperatures of between -20°C and -45°C. ■

Germany industry wants to use 'blue' hydrogen in a transition period

Heads of German industry have been urging the government Berlin to allow the use of 'blue' hydrogen, made from natural gas while capturing carbon, for a transition period. 55% of the 2,500 surveyed decision makers, notably the steelmaker Thyssenkrupp and energy company RWE, want to use blue hydrogen which is cheaper to make than 'green' hydrogen.

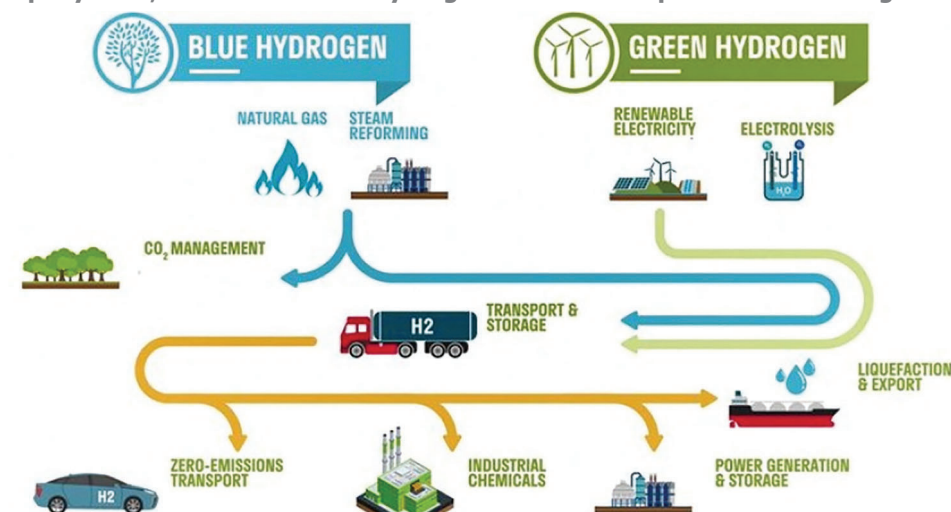
Blue hydrogen is made by splitting natural gas into H₂ and CO₂ through steam methane reforming, whereby the CO₂ is captured and stored. Process launched by Shell Catalysts allows producing blue hydrogen at a cost of \$25–35 per tonne.

Green hydrogen, produced through electrolysis using only renewable energy, is still more than double as expensive to produce through 2030. Analysts do not expect green hydrogen to achieve cost parity with the blue one until about 2045.

Today, the National Hydrogen Strategy says that only green hydrogen is "truly sustainable" in the end, but other CO₂-neutral forms like blue and turquoise (made with nuclear power) would be traded on the market. The rules are still changeable, though as the government strives to accelerate the adoption of the emission-free fuel.

Grey hydrogen helps with technology adoption

Germany's hydrogen council recently called



on the government to quickly make a decision on whether hydrogen made on the basis of natural gas using carbon capture and storage (CCS) should be used to "help with the market ramp-up of the technology." However, some members of the council called for using only "green" hydrogen made with renewable electricity.

"This decision will have a decisive influence on possible quantities to be imported

and the associated potential for CO₂ savings," government advisers said.

Hydrogen is seen as a silver bullet for sectors with particularly stubborn emissions, such as heavy industry and aviation. After the September election, the new government will need to rush through its hydrogen strategy to reach Germany's tightened climate targets or reaching climate neutrality by 2045, and cut emissions by 65 percent by 2030. ■

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