



'Banks fail to factor in climate risks when granting loans'

Debt financiers do not sufficiently factor in the impact of climate change, the German Federal Financial Supervisory Authority (BaFin) finds. Extreme weather events can cause flooding or drought which heavily impacts operations of electric power stations and factories – putting repayment of loans at risk and forcing insurers to shoulder substantial claims.

For long, BaFin has focussed mainly on 'transitory risks' related to climate change, e.g. loans for coal-fired power stations that would have to be written off amid political decisions to phase-out the fuel.

Now, the financial watchdog is waring of the 'physical risks' of climate change: BaFin President Mark Branson acknowledged that companies made "some progress on managing their sustainability risks" – but he urged banks to "better prepare for worsening consequences of climate-related extreme weather events."

Focus on 'physical risks' and data access

Regulators themselves also have to do some catching up: "So far, we have underestimated the physical risks in regulation," Branson conceded. In particular, ESG-related regulation needs to be made



less complex and more consistent, especially with regards to transition plans. At the same time, BaFin already came forward and shared ideas related to practical disclosure obligations for investors.

Going forward the financial regulator will mandate banks and debt financiers to scrutinize how companies adapt to climate change, environmental risk and the loss of biodiversity. By means of random samples, BaFin will examine how companies in the financial sector comply with the requirements of the EU Disclosure Regulation.

However, access to relevant data is a big issue: Many banks and insurers still lack the necessary data to fully assess the risks, e.g. customer's location to gauge the probability and impact of flooding.

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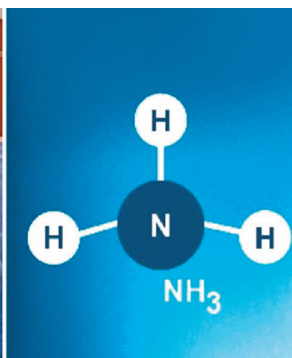
Hanwha and Baker Hughes jointly develop NH3 gas turbines

Ammonia (NH₃), an efficient medium for hydrogen (H₂) storage, will be used to co-fire turbines under development by PSM, an American subsidiary of Korea's Hanwha Group and Baker Hughes. The turbine will be capable to run 100% on ammonia, or operate with a natural gas and ammonia blend.

The Korean/American duo announced their technology partnership Baker Hughes annual meeting in Florence today.

The NH₃-fuelled gas turbine to be developed through this collaboration will be based on Baker Hughes's proven, small-size turbine technology and a newly-developed ammonia combustion system created by PSM, fully owned by Hanwha Group.

PSM's initial high-pressure ammonia combustion test were successful, while Baker Hughes finalized initial turbine feasibility studies – paving



the way for a swift start to co-developing an the NH₃-driven turbine.

AEMWE technology

Anion exchange membrane water electrolysis

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Tackle greenwashing

Lenders tend to use ESG ratings to assess the suitability of the companies in which they invested. But these ratings often evaluate a company's financial climate risks - i.e., the extent to which climate change

could affect the company itself, for example. Whether the company has a positive impact on sustainability aspects, i.e. whether it makes its own efforts to protect the climate, for example, sometimes plays at most a minor role in the ratings.

To tackle this, BaFin has vowed it will "make even greater use of its powers under prospectus law to prevent "greenwashing" – for example, by prohibiting the advertising of a securities issue if it contains false information on sustainability. ■

Gas-burn soars in Pennsylvania to nearly 60% of power

Natural gas-fired power generation has risen in Pennsylvania to currently over 57% of the states' energy mix, more than twice the 26% share in October 2013 as utilities displace coal with dry gas. With a growth rate of 64%, or 1.7 Bcf/day, Pennsylvania has the highest growth in gas-burn and industrial gas use among the top five U.S. states.

Over the past decade, gas use increased in all of the top five gas consuming states except California, where the

contribution of gas in the power mix has fallen by 15% as the state incentivises the build-out of renewable energy sources.

Pennsylvania quest for gas is spurred by the abundant and low-cost supply of the fuel. The state sits on top of the Marcellus shale play within the Appalachian Basin – one of the largest tight oil and shale gas plays in the United States. Dry gas production from Marcellus soared from 8.9 Bcf/d in 2013 to currently almost 22 Bcf/d sending the cost of gas plunging compared

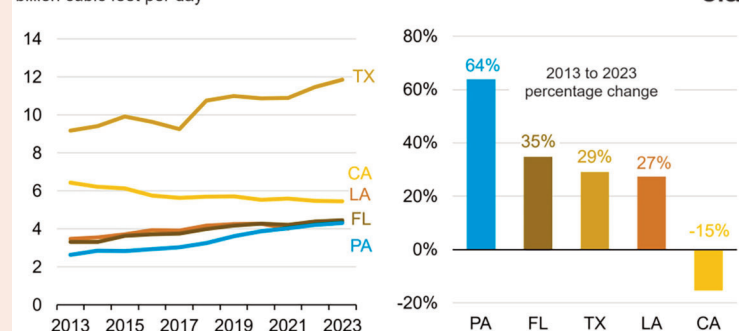
efficient combined-cycle gas turbine power stations.

Gas-burn for power generation kept rising over the past decade. The power sector's gas use averaged 1.0 Bcf/d in 2013 but more than doubled since then to 2.6 Bcf/d last year – while gas use in the residential, commercial, and industrial sectors remained relatively stable.

In July 2024, gas-burn reached an all-time monthly peak in Pennsylvania of 15.3 million MWh as widespread heatwaves sent hourly electricity demand soaring. Last summer, U.S. electricity demand in the Lower 48 states was greatest at 6:00 p.m. Eastern Daylight Time on July 15, 2024, when it reached about 745 GWh, according to government data.

Today, more electricity is generated in Pennsylvania than is consumed, allowing generators to sell surplus electricity to other states. Utilities in Pennsylvania in 2023 sent more electricity outside state borders than companies in any other state in the country, moving 83.4 million MWh to neighbouring states. ■

Annual natural gas consumption, top five consuming states in 2023 (2013–2023)
billion cubic feet per day



Data source: U.S. Energy Information Administration, *Natural Gas Monthly*
Note: PA=Pennsylvania, FL=Florida, TX=Texas, LA=Louisiana, CA=California

with rival energy sources.

Attracted by cheap fuel costs, electric power generators in the state heavily invested to convert coal-fired power plant to run on natural gas or upgrade single-cycle to more

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(AEMWE) technology is under development, which can produce hydrogen using less power and with a lower initial investment cost than existing water electrolysis methods. Ammonia can store hydrogen at higher volumes and is hence viewed as a "promising carrier." Hanwha Impact conducting research with the aim of commercialising ammonia cracking by 2027.

The technology will be a game changer for large ship owners, enabling a completely carbon-free mode of propulsion. The American Bureau of Shipping (ABS) already approved the use of ammonia gas turbines to LNG carriers. One large LNG shipping company in Europe already signed a memorandum at Gastech 2024 to convert its propulsion system to an ammonia gas turbine-based system.

Electric utilities and energy-intensive industries also stand to benefit from the technology which can be adapted to power

smaller-scale, decentral power system.

Near-60% hydrogen co-firing

South Korean petrochemical company Hanwha Group has been rushing to set up a hydrogen value chain alongside technology to co-fire the clean-burning fuel in industrial and utility-scale power stations. Tests recently demonstrated a 59.5% hydrogen co-firing rate at an 80 MW gas turbine, installed at a plant in Seosan City run by Korea Western Power.

Going forward, Hanwha Impact plans to implement its technology also at the 150 MW unit 1 gas turbine of the West Incheon power station. Though co-firing can significantly lower emissions, hydrogen has a substantially higher combustion speed and flame temperature than natural gas, hence the manufacturers need to adapt the material of the combustor and the turbine coating to withstand it. ■

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Chinese developers install 24 GW in 'Belt & Road countries'

Overseas power projects, completed under China's Belt & Road initiative, reached a record 24 GW in 2024 – doubling capacity installed in the previous year, Wood Mackenzie finds. Solar power accounted for 8 GW of these projects amid falling technology costs – though 48% of completed projects were legacy coal-fired and gas- or oil-fired plants, with 6 GW each.

The rapid growth in overseas solar projects in 2024 is remarkable," said Alex Whitworth, WoodMackenzie's head of Asia Pacific power and renewables research. Chinese developers, in his view, appear to prioritise investments in greener power gen technologies overseas and these make up over two-thirds of the project pipeline.

This trend is driven by falling technology costs for renewable power technology, largely thanks to China-made solar panels. "Chinese companies are leading its deployment in many developing markets that could not previously afford it," Whitworth explained.

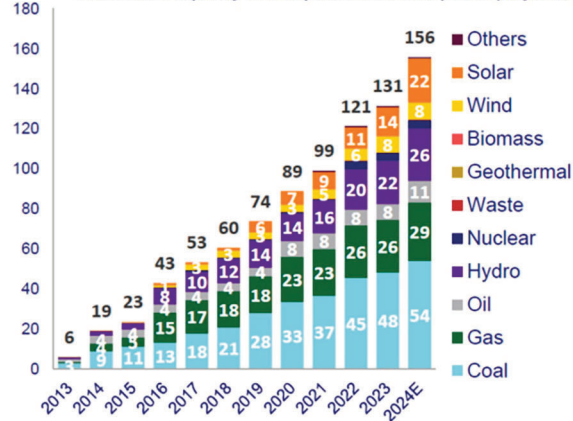
19 GW of coal power still in the pipeline

In Wood Mackenzie's latest 'Update on the Belt & Road Initiative' report, analysts celebrated the China's record investment and the apparent shift towards cleaner technology.

However, the report also clearly states that 19 GW of coal power projects remain in the pipeline, although they are subject to potential cancellations due to the global shift away from coal and China's 2021-policy announcement of 'No new overseas coal power'.

In addition, 9 GW of gas projects are currently under construction or in the planning stages.

Cumulative capacity of completed overseas power projects, 2013-2024 (GW)



Source: Wood Mackenzie Lens Power

Massive overseas investment in B&R countries

Chinese companies have installed 156 GW of power projects in participating countries since the launch of the B&R Initiative in 2013. This amount is 1.5 times the total installed capacity of Australia as of last year.

"Chinese companies have installed 156 GW of power projects in participating countries since the launch of the B&R Initiative," said Yanqi Cao, managing consultant Asia Pacific power research. Between 2013 to 2024, these companies completed 369 overseas power projects, representing an investment of approximately US\$281 billion.

Developing countries are still the primary focus of the B&R Initiative, with Asia ac-

counting for 70% of the installed capacity, followed by Africa at 15%. Pakistan, Indonesia, Vietnam, Saudi Arabia, and Malaysia – the top five B&R markets – are projected 120 GW requiring an investment of US\$73 billion in green energy installations.

Saudi Arabia is forecast to have the highest demand, with plans to install 41 GW of solar power and 13 GW of wind power.

"Chinese companies are more and more involved in investing in renewable power in the top five B&R markets. Five years ago, they accounted for only 7% of the wind and solar capacity in these markets," Cao said, anticipating this share has increased to over 60% in 2024, and it could reach 80% by 2030 – if the current trend continues. ■

JERA sets up project vehicle for Chita power units 7 & 8

Japan's leading LNG importer JERA and Toho Gas have set up Chita Energy Solutions as 'implementing body' to build and operate Units 7 & 8 of the Chita gas power station. Construction is scheduled to start early next year with a view to commission the two 650 MW units in August and December 2027, respectively.

Chita Energy Solutions, established through joint investment by JERA and Toho Gas, will construct, operate and maintain both thermal power units. The parent companies vowed to share their expertise and resources, notably a steady stream of LNG shipments to fuel the combustion process.

The two new combined-cycle units, 659.9 MW each, will be built on the grounds of JERA's Chita thermal power station in Japan's Aichi province.

Conversion after conversion

Operational since 1966, the Chita power

complex has undergone a series of conversion and upgrades over the past decades. The complex had first been operated by Chubu Electric but was transferred to JERA, following Chubu's joint venture with Tepco.

Units 1 through 4 were modernized and converted to burn natural gas in 1985, whereas Units 5 and 6 were designed as LNG-fired plants from the start. In the early 1990s, Units 1, 2, 5 and 6 were converted into combined cycle plants by adding a gas turbine to the existing boiler-steam turbine units to

reuse exhaust gases. These upgrades had given the Chita Thermal Power Station a total power generating capacity of 3,966 MW, entirely fuelled by LNG. ■



Bird's eye view of Chita thermal power station



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Cummins, Liberty to deploy gas-fuelled hydraulic frac system

Liberty Energy and Cummins have announced that the industry's first gas variable speed, large displacement engine will be deployed to power Liberty's digiPrime hydraulic fracturing platform in the first half of 2025. The two U.S. companies partnered to improve their service offerings and make the fuel-versatile HSK78G engine EPA Mobile Off highway compliant.

For the project, Cummins' HSK78G engine will be adapted Liberty's digiPrime platform to improve the gas spark-ignited engine's response time and load acceptance. HSK78G engines, first launched in March 2019, normally get used as part of a fixed speed generator set. It is designed to provide reliable power, regardless of the natural gas source or the operating environment.

The digiPrime pump, anchored by a

3,000-horsepower gas variable speed engine, is a direct drive solution with outstanding thermal efficiency which helps reduce fuel costs.

Adapting Cummins technology helps Liberty improve their service offerings: "A variable speed, direct drive platform enhances Liberty's digiFleet offering by combining high fuel efficiency with the ability to manage transient load and precision rate control," said Ron Gusek, President and named

successor to the CEO of Liberty.

The HSK78G base engine can operate across various gas compositions, and its high tolerance to fluctuations in methane content of fuels makes it a good fit for the well-servicing industry. With its front power take-off, it gives customers options to support auxiliary power needs on location when operating below peak load – and the variable speed HSK78G engine will be EPA Mobile Off highway and CSA compliant. ■



“

A variable speed, direct drive platform enhances Liberty's digiFleet offering by combining high fuel efficiency with the ability to manage transient load and precision rate control

”

– Ron Gusek, President and named successor to the CEO

H2-readiness of John Cockerill's HRSGs get certified

Hydrogen-readiness of John Cockerill's heat recovery steam generators (HRSGs) has received a concept certificate from the German classification society TÜV-SÜD. A modified design of heat recovery boiler allows the combined-cycle power plant to run on hydrogen instead of fossil fuels – as the EU Green Deal targets net-zero emissions by 2050.

“Designing HRSGs for future hydrogen operations (...) will propel us in the energy transition, and the zero-emission generation,” said Eric Absil, head of John Cockerill's Energy Solutions Business. HRSGs are steam generators that recover heat from hot flue gasses at the outlet of gas turbines. The heat is transformed into steam to drive a steam turbine and generate electricity or a combination of heat & power.

Aspiring for new projects

These HRSGs were re-designed and John Cockerill's H2-readiness concept for the bidding phase of new projects now got the greenlight from TÜV. The certification applies to both drum-type and once-through boiler designs, covering vertical and horizontal configurations, with or without supplementary firing and fresh air firing capabilities. This adaptability makes the technology suitable for both new installations and retrofitting existing plants,

Headquartered in Seraing, Belgium, John

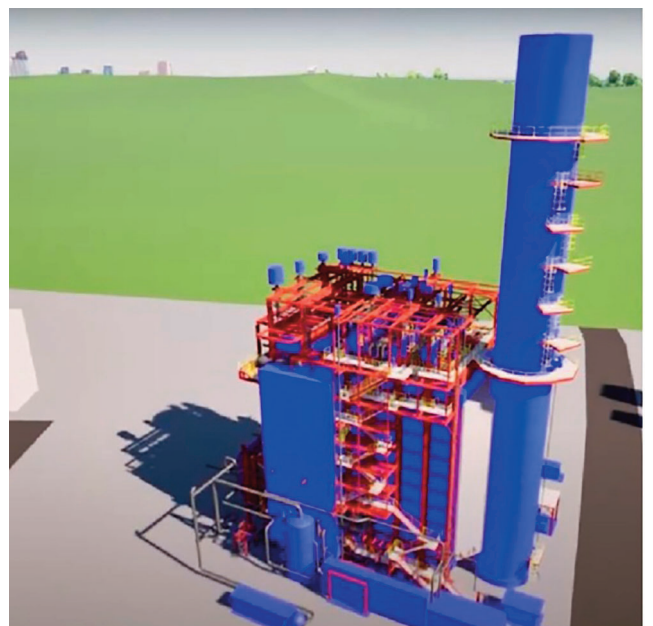
Cockerill – formerly known as CMI – is one of only two manufacturers to have received this recognition. The certification validates the company's engineering expertise in hydrogen applications and assures energy providers that its steam generators comply with stringent safety, ventilation, purging, fire, and explosion protection requirements.

Prospective customers

The shift towards hydrogen as a clean energy sources is gaining momentum: Oil & Gas companies, in particular, are embracing hydrogen-fired combined cycle power plants, either as standalone solutions or in blended configurations with natural gas.

Power utilities, industrial cogeneration facilities, and energy-intensive sectors are

also key adopters of H2-ready HRSG technology, as they seek to reduce their carbon footprint while maintaining operational efficiency. ■



Render of TÜV-approved HRSG design

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Material informatics to revolutionize battery development

High energy-density chemistries and materials can be developed faster through machine learning than through physics-based, trial-and-error material discovery. Materials informatics applied to discover electrolyte, electrode, current collector and packaging materials, can significantly speed up the development process, finds IDTechEx technology analyst Daniel Parr.

Materials informatics has existed for several decades as successor to bio-informatics, and its application requires a database of candidate materials for an agent to be trained on. For battery materials, example descriptors include redox potential, diffusion coefficient, density, bond dissociation energies, dielectric properties, viscosity, etc. Without a complete and well-described training database, the application of materials informatics will lead to mis-fitting.

Virtual screening – the more developed use case – is when a database of candidate materials has already been generated, and agents remove low-potential materials to

enable selective testing. De novo design, meanwhile, is an emerging technology that utilizes generative AI to design entirely novel materials.

Virtual Screening vs. De Novo Design

Each approach has different challenges associated with it: "Virtual screening can only be used to screen known materials, and the total space that can be explored is limited. Further, for emerging battery chemistries, the database for known materials is less populated, so a screening agent's predictive capacity is limited," Parr pointed out.

"De novo design, in contrast, is relatively

immature – and though it has seen some success, most of this is in research rather than in the commercial world," he explained. Completely novel materials also lack existing supply chains, and as such they are expensive to synthesize as they do not benefit from economy of scale.

Well-established chemistries tend to heavily favour virtual screening approaches over de novo design, while less established chemistries will require de novo design.

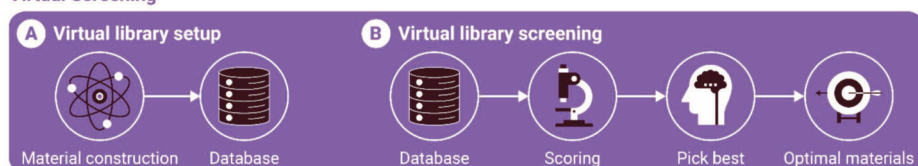
Lithium-metal makers favour de novo design

Though today's players in the materials informatics space employs roughly a 50/50 proportion of each. "However, it is likely that as new chemistries become more mainstream and de novo design shows more results, de novo design will become the primary materials informatics tool for battery material development," Parr forecasts.

IDTechEx hence predicts that materials informatics will become a necessary part of the battery development over the next decade – especially as new chemistries like lithium-metal become more common. ■

Virtual Screening vs. De Novo Design Process Flow

Virtual Screening



De Novo Design



SSE Thermal turns to Ansaldo to realise 300MW biofuel plant

British power generator SSE Thermal has turned to the Italian manufacturer Ansaldo Energia to realise a 300 MW power station that will fully run sustainable biofuel. Tarbert Next Generation Power Station, situated in Ireland, will be driven by an AE94.3A HVO turbine capable to combust hydrotreated vegetable oil (HVO).

When burnt for generating electricity, HVO produces less carbon emissions than traditional fossil fuels.

Tabert, designed as a simple-cycle plant, will be capable to ramp up at short notice at times of peak power demand with a view of balancing Ireland's fast-growing capacity of wind and solar PV installation.

According to Ansaldo, the AE94.3A has field-proven excellent results in terms of op-

erational flexibility and reliability and cost-effectiveness. Some 115 units are installed worldwide with more than 5 million of equivalent operating hours.

The new project award demonstrates the Italian OEM's capacity to offer low-CO₂ power gen solutions. "Our capabilities on HVO successfully complement those on hydrogen, thus providing customers a wide choice to decarbonize their assets", underlined Ansaldo Energia's Chief Technology Officer, Federico Bonzani. ■

NEWS NUDGES

MTU gensets approved for biofuels

Rolls-Royce has gained approval to use synthetic fuels in its MTU Series 4000 and Series 1600 diesel engines for power generation application. Field testing confirmed both engines can use a range of sustainable fuels including biomass-to-liquid, hydrotreated vegetable oil and power-to-liquid fuels such as e-diesel.

Algae produce lipid biofuel feedstock

Synthetic Genomics and ExxonMobil have worked together to turn algae into a low-emission transportation fuel, aiming to make algae affordable and scalable for use as a transportation fuel.

At a farm in California, researchers are farming algae at a much larger scale than the sample-size quantities used in labs so far. Field and lab work combined are hoped to lead to the technical ability to produce 10,000 barrels of algae biofuel per day by 2025. ■

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