



Texas narrowly avoids cascading blackout thanks to gas peaking plants

The Electric Reliability Council of Texas (ERCOT) has narrowly avoided a cascade of power failures thanks to a small surplus of gas supply near some peaking power plants. Natural gas fuels more than 40,000 MW generating capacity in Texas during peak periods, but the latest cold freeze disrupted production and made pipeline compressors trip.

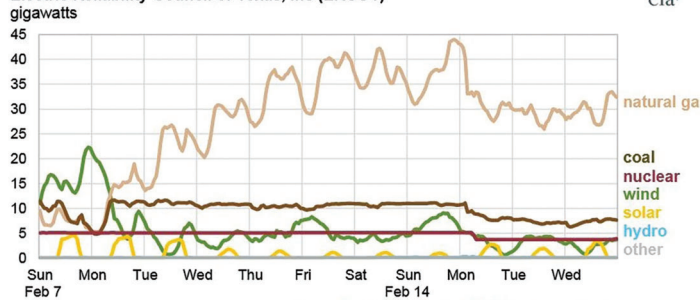
Reduced upstream gas production, and lower transmission rates through intrastate pipelines meant that power generation had to rely on onsite storages for fuel supply. Grid Monitor data show that natural gas-fired power generation fell sharply once ERCOT began implementing rotating outages at midnight on February 15. Output from coal-fired plants, a nuclear facility, and wind farms all fell near midnight on February 15 and remained at the lower level.

ERCOT manages the supply and distribution of electric power to 26 million customers in Texas, covering about 75% of the state's territory and 90% of its electric load. The system is at higher risk of blackouts because the grid operator refuses to join interstate grids which would enable power imports at the event of a cold spell or heat wave.

The Texan governor Greg Abbott called for a review of ERCOT's preparations prior to the latest winter storm, criticising the fact that the grid operator had proven to be "has been anything but reliable



Hourly net generation by energy source (Feb 7–Feb 17, 2021)
Electric Reliability Council of Texas, Inc (ERCOT)



Source: U.S. Energy Information Administration, *Hourly Electric Grid Monitor* (ERCOT net generation by energy source)

over the past 48 hours." He also levied part of the blame for outages on private power generators.

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Germany's Bilfinger and Munich Re pull out of Nord Stream 2 project

German construction firm Bilfinger and the infrastructure finance arm of Munich Re have both withdrawn from work related to the construction of the Nord Stream 2 pipeline through the Baltic Sea, due to looming US sanctions. Bilfinger had been contracted to deliver and operate process control systems and supply a gas-fired heat and power unit.

The exit of Bilfinger and Munich Re brings the number of European companies that have withdrawn from the controversial pipeline project to at least 18, according to a report by the US State Department. These companies include the Swiss Zurich Insurance Group and the Paris-based Axa Group.

Only KVT-RUS hit with sanctions

So far, however, actual sanctions have only been imposed on the Russian company KVT-RUS, the owner and operator of the pipe-laying ship Fortuna that is building the final stretch of Nord Stream 2.

But the State Department spokesman Ned Price said on Monday "We have made it clear that companies risk sanctions if they are involved in Nord Stream 2." He conceded, however, that the US



The Russian pipe-laying ship Fortuna is building the final stretch of Nord Stream 2

government will continue to consult with its European allies and will not "surprise" any company with unsolicited actions.

The US State Department report, compiled under the Trump administration, openly criticises Germany's attitude towards the project: The

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Low reserve margins

Texas, the home to the US oil and gas industry, has been adamant to refuse the adoption of some federal energy regulation as has been proud to manage its energy supply independently. This can make the grid trip and collapse, like last week, when a winter storm left more than 4 million people without electricity in Texas. The grid operator was not able to cope with the sudden demand spike, while fuel shortages forced some utilities to implement rolling blackouts. A total blackout was narrowly avoided.

Every summer, the Texas grid operator needs to issue power emergency alerts and the system's electric reserve margin of around 8.6% is insufficient to meet strong electric demand growth. Power grid operators typically aim for reserve margins of

10% to 15% and ERCOT itself had set a target of 13.75% and the Federal Energy Regulatory Commission (FERC) has repeatedly voiced concerns about ERCOT's low reserve margin and about gas supply constraint in West Texas.

Lack of safeguards

Part of the reason to the latest near-collapse of the Texas power grid is due to an earlier decision, taken by ERCOT in 1999, to fully deregulate the market and hand the control of the state's electricity supply to private power generators, energy retailers and transmission companies. The top-to-bottom deregulation, signed into law by the former President George W. Bush, reduced wholesale power prices but had fewer safeguards.

Today, Texas is the only US state with a stand-alone electricity grid without inter-

connections to other market zones. This lack of interconnection capacity means that Texas is at greater risk of blackouts, given that almost no electricity can be imported from other regions in the event of a sudden spike in demand.

ERCOT is also not under any federal oversight and is largely responsible to manage its own sources of energy supply, transmission as well as power generation capacity.

Cheap natural gas, abundant in Texas, powers much of the state's installed generating capacity but the rise of intermittent wind power in-feed means that the supply is much less stable, and balancing the grid becomes much more of a challenge. Cost-conscious utilities, however, avoid investing in extra backup capacity which makes the overall system prone to failure. ■

VW sells more electric cars than Tesla for first time ever

Volkswagen has sold more electric cars worldwide than Tesla – for the first time ever – as electrification of transport accelerates in Europe, the US and China. The brands of the VW group, which include Porsche and Audi, sold 192,000 fully electric cars or plug-in hybrid vehicles in the fourth quarter, compared to Tesla's 181,000 e-vehicles sold.

Due to the Covid-19 crisis, the auto industry faces a volume drop of up to 36 million units over the next three years, and a new-debt burden now totally \$72 billion. But e-vehicle sales recovered in the fourth quarter of 2020, when Tesla sold cars with a combined range of around 100 million kilometres, compared to VW's 45 million kilometres.

Europe overtook China as the world's largest e-car market with sales of 1.4 million in 2020, and the global share of electric cars in new registrations more than doubled within a year to almost 6% at the end of 2020, according to a report by the consultancy AlixPartners.

"The e-car market is experiencing an unprecedented surge in demand worldwide, from which German car manufacturers in particular are also benefiting," said the authors of the report, Nicolas Franzwa and Marcus Kleinfeld. German carmakers - often described as sleeping giants with regard to e-cars - are now catching up, they said, noting the study proves „they are [now] putting their sales horsepower on the road in e-vehicles as well."

Hybrid vs. full electric cars

Both full battery-electric vehicles and plug-in hybrids - which also have a small combustion engine on board - usually count as electric cars, though „mild hybrids' without a plug do not. Tesla only sells electric cars without a conventional motor, while VW

also has plug-in hybrids on offer.

Critics say plug-in hybrids are "not as clean" because many are often driven in combustion-engine mode and are not charged. This fact is reflected in Alix Partners' ranking of combined total electric range of all cars sold, where Tesla remains the undisputed leader. ■



Scheme of VW's electric car

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German government is still fully behind the Nord Stream 2 project," it reads, followed by "German firmly rejects US sanctions as an attack on the sovereignty of Germany and the EU."

Biden might turn a blind eye

The new Democratic President Joe Biden has signalled his administration might allow the pipeline to be completed, much to the anger of Republicans in the Senate.

US Republicans fiercely oppose the Gazprom-led pipeline project, claiming it undermines Europe's energy independence. The former President Trump had managed to stop construction works shortly before the completion of Nord Stream 2 by enacting initial sanctions under the PEESA law against companies involved in the projects.

But critics say the sanctions are biased and serve US interests to sell their higher-priced LNG to buyers across the Atlantic. ■

UK Chancellor mulls new carbon taxes to reach Net Zero emissions

Rishi Sunak, the UK Chancellor is expected to set out new mechanisms to reach the 2050 Net Zero emission target in the Government's 2021 budget on March 3. With November's Climate Change Conference in mind, the Government is looking at novel ways to tax carbon emissions.

But introducing a general carbon tax on all goods and services is tedious and takes time, while changes to existing green taxes (e.g. a new plastic packaging tax) would be easy to implement. Post-Brexit, the Chancellor has the possibility to introduce a higher VAT rate for environmentally damaging goods and services, or raise the fuel duty which had been frozen for 11 years.

"With COP26 on the horizon the Government will no doubt want to look at what measures can be taken to incentivise green action, and where others may need to pay for their carbon footprint. A carbon tax is

reportedly being considered as one way for the Chancellor to begin this process," said Mike Barber, Deloitte's sustainability and climate change partner.

Three quarters of respondents to a recent Deloitte survey said they believe the climate crisis is of "similar or greater magnitude than the Covid-19 pandemic," and business leaders ranked it as the top societal issue for businesses to tackle in the next decade.

Tackling industry emissions

Progressive electrification is one approach to help reduce industry emissions given that

it allows linking the load profiles of heavy industry, transport and services. Provided taxation per energy unit will be harmonised, such sector coupling would allow the heavy industry to procure green energy at favourable costs, DNG GL research finds.

To reap the benefits of sector coupling, harmonise the load profile and reduce emission, the taxation needs to

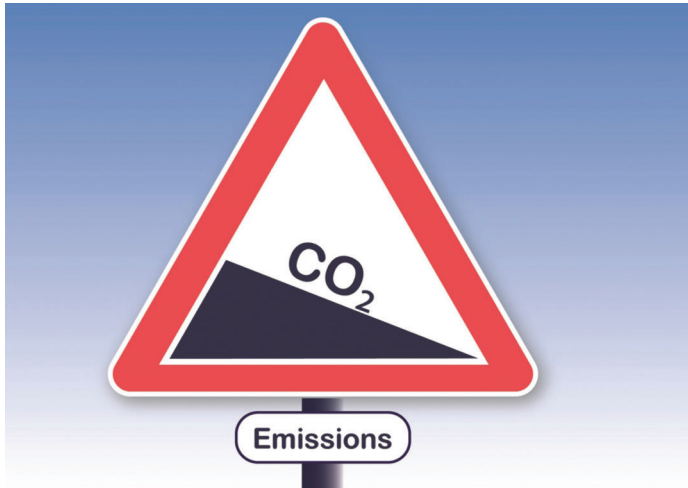
be harmonized per energy unit for the different energy carriers or even better per CO2 footprint.

"Energy taxes have as a purpose to stimulate energy efficiency and reduce the use of primary energy sources. However, the use of renewable wind and solar electricity during times of oversupply need to be encouraged instead of being punished. This would be a win-win situation, helping to decarbonise heavy industry while remaining competitive and benefit consumer pockets," said DNV GL chief executive Ditlev Engel.

Denmark removes tax barriers for CHP

"Leading this so far is Denmark," analysts noted. Recognized for its high contribution of wind energy, the country has also a very strong history of coupling electricity and heat: 65% of its population is connected to district heating, fed by combined heat and power generation.

The Danish government is now removing tax barriers for integrating electricity and heat demand. According to DNV GL analysis, "this will benefit both the heat and wind sectors in Denmark, as the opportunity cost of avoiding using natural gas in district heating can set a bottom price for wind energy during surplus production." ■



Green recovery efforts in Germany fall short of EU minimum share

Germany's investments under the European recovery programme are below the required minimum share. The government proposed a €130 billion recovery package in 2020 and promised to add another €300 billion to the EU Recovery and Resilience Facility, but green energy spending is still significantly below the 37% benchmark set by the European Commission.

On 18 December 2020, the European Council and the Parliament provisionally agreed the Recovery and Resilience Facility (RRF), worth €672.5 billion to rekindle economies in the wake of pandemic and to accelerate a green and digital transition. Each EU member stated committed to contribute a share to the overall RRF fund, but analysts at the Wuppertal Institute and E3G found the German government has, so far, not lived up to its promise.

"When assessing all recovery measures, Germany reaches a green spending share of just 22%. In contrast, 36% of all measures have a negative impact or are at least at risk of having a negative effect on the green

transition," analysts argued. While the national recovery measures do unlock "some necessary progress" to spur decarbonisation, they remain often rather ambiguous, particularly in the automotive industry, where controversial plug-in hybrid and combustion engine technology still receive support.

Projects relabelled

Critics say Germany's low share of green energy investment could be also due to the fact that the government simply relabelled some existing projects that fit the EU's conditions, and did not free up new funds to accelerate green recovery efforts.

France, Europe's second biggest

economy, appears similarly unambitious to increase its climate spending which could bode ill for the EU's overall green recovery effort. Environmentalists warn if other countries see that the European heavy-weights do not engage in a comprehensive modernization. ■



TDK joins GenCell in developing low-cost approach to green ammonia

Japanese battery manufacturer TDK and the Israeli fuel cell maker GenCell agreed to invest \$85 million into developing a low-cost approach for green ammonia. The new low temperature process is designed to produce carbon-free ammonia that could replace the 235 million tons of industrial ammonia produced today, worth an estimated \$70 billion.

Striving to broaden its scope, GenCell wants to not only produce clean power from fuel cells but also green ammonia - the fuel on which the company's alkaline fuel cells run. Developing a technology to produce green hydrogen would allow GenCell, in its own words, "to deliver a self-sustained circular economy green source of power to the customer site, no matter how remote. "It would allow GenCell to position itself as a well-to-wheel total green energy solution provider.

GenCell, based in Petah Tikva, Israel, has 90 employees who developed a process to create hydrogen-on-demand from anhydrous ammonia (NH₃). This enables the company's proprietary fuel cells to produce primary power for off-grid and poor-grid sites, as well as rural electrification. Going ahead, researchers will now work on designs and concepts for green ammonia synthesis and translate them into a repeatable process in order to streamline and economize ammonia production.

Ammonia is expected to grow into a market with 1 billion ton per annum of global production, as power generators and industry turn to the fuel to realise decarbonisation goals. Green ammonia, produced from

renewables energy sources, can be used as a fuel for marine shipping or power plants, as a feedstock for fertilisers or to drive alkaline fuel cells.

Independent "nano-power" stations

The envisaged clean "nano-power" stations are meant to run independently from the grid, allowing operators to circumvent the complex logistical and cost challenges to transporting and storing hydrogen as well as the strict regulatory barriers limiting mass distribution of large quantities of ammonia.

"We are confident that our disruptive and economical approach will displace costly alternatives and garner interest and market share both for TDK and GenCell," said GenCell CEO Rami Reshef said. "This technology," in his view, "will enable the broad availability of green ammonia and the proliferation of self-sustaining green ammonia-driven "nano-power" stations that will empower us to move towards eliminating carbon emissions and neutralising the climate crisis.

For TDK, the technology of "nano-power" stations running on green hydrogen would put in a prime position to sell such solutions



GenCell-patented catalyst, a vital part of the company's alkaline fuel cell

to Japanese utilities and industries which need to fulfil the government's 2050 zero emission targets. Dai Matsuoka, chief technology officer at TDK expressed confidence that the technology cooperation with GenCell will be successful as both firms will be "applying deep materials science knowledge to create the chemistry that will fuel our future."

TKD Corporation, headquartered in Tokyo, Japan, produces passive components such as ceramic, aluminium electrolytic and film capacitors, as well as magnetics, high-frequency protectors and sensors. The company also provides electric utilities with magnetic heads and lithium ion batteries. In fiscal 2020, TDK posted total sales of USD 12.5 billion and employed about 107,000 people worldwide. ■

CAS launches industrial heater with temperatures to 1110°F / 600°C

Cast Aluminum Solutions (CAS) has launched a new CAST-X high temperature heater with 1500 Watt electrical power that is capable to withstand operating temperatures of up to 1110°F Fahrenheit, or 600°C Celsius. Thanks to its isolated fluid path, the new device can safely heat natural gas, diesel fuel, jet fuel and various alcohols under high pressure.

Process gases such as nitrogen, argon, CO and CO₂ (even in a cryogenic state) are also well-suited for CAST-X heaters, the developer said. Available in two primary sizes, the device has a 1/4 inch fluid gas flow-tube and is

compatible with most voltage levels.

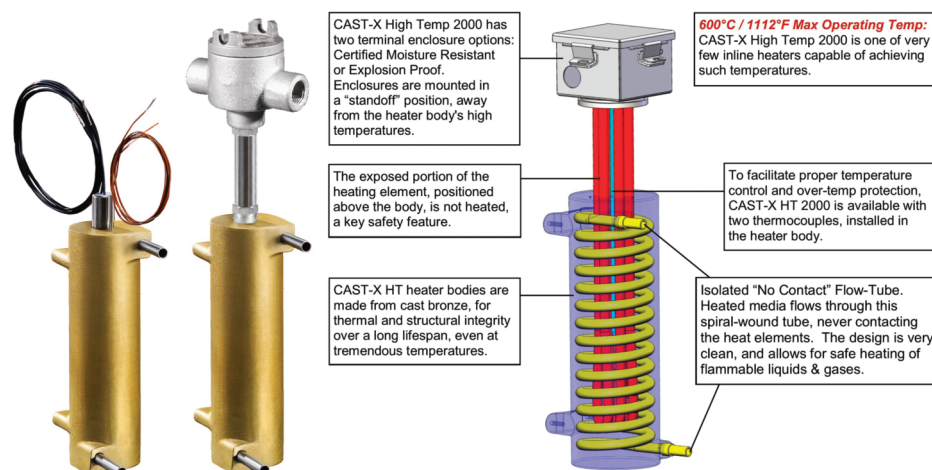
Manufactured in Batavia, Illinois, the CAST-X heaters come with an explosion proof terminal enclosure (for hazardous locations) or with no enclosure (for inert applications). The CAST-X HT 2000 unit can accommodate

higher-flow applications at an electricity range of up to 6 kW and a 1/2 inch flow-tube.

No-contact principle

All heaters are designed in a way that the heated fluid never contacts the heating element. Hereby, the liquid or gas flows through a spiral-wound stainless steel or Inconel flow-tube, which is isolated inside the heater body to keep both elements separate. According to CAS engineers, this design is much safer and cleaner than standard immersion heaters, where media is in direct contact with heating elements.

Many of today's complex catalytic reactions and high-efficiency purification applications require processing temperatures much higher than traditional industrial heaters can deliver and the new CAST-X High Temp Heaters are designed to fit these requirements. ■



Li-ion batteries dominate energy storage market

Lithium-ion based batteries are still dominating the stationary energy storage sector but a rising number of companies try to develop different technology types. Among the Li-ion batteries competitors, the Redox Flow Battery (RFB) system – based on flowing two liquids as electrolytes across the electrode – is seen as an attractive approach.

The RFB principle, developed by researchers in Cambridge, UK, functions by letting two liquids with electroactive species flow across the electrode which creates a chemical reaction that generates electricity.

Longer storage time

Though Li-ion batteries are expected to dominate the market for the time being, analysis carried out by IDTechEx finds that Redox is emerging as a “promising competitor.” That’s because RFBs can store energy for longer than the average 4 hours of a Li-ion system.

“The larger the amount of electrolyte, the bigger the amount of energy stored in the battery, analysts explained, while the electric power output of a RFB is defined by the size of the electrode stack and the kinetics of the chemical reaction.” In contrast to Li-ion batteries, RFB batteries have a decoupled energy and power capacity which allows a bigger customisation of this kind of system.

Vanadium used as electrolyser

Looking into electrolysers, there are different types of electroactive species which have been investigated to increase the efficiency of RFB systems. The first and most used Redox Flow Battery chemistry is the Vanadium redox flow battery, which is today the most studied and manufactured technology of its kind.

Researchers stressed that all RFB battery

types, the vanadium technology – and similarly the All-Iron RFB one – use vanadium as the electroactive species, though with different oxidation states.

Costly material, low efficiency

However, the high cost of vanadium as a raw material and the low round-trip efficiency of the RFB solution are main drawbacks, analysts noted.

“The electrolyte alone accounts for 30% to 40% of the overall technology cost. To reduce the effect of vanadium cost on the overall system, an increasing number of companies started collaborations with vanadium mining companies,” analysts at IDTechEx pointed out.

Apart from the Redox Flow Battery manufacturers themselves, some mining companies are also looking into this technology such as Bushveld Minerals in South Africa. The miner is actively promoting the adoption of vanadium flow batteries all over Africa, and also backed the merger between two VRFBs manufacturers, the English redT and the American Avalon Battery. Two years ago, Bushveld Minerals bought a major stake in Enerox-CellCube, previously known as Gildemeister AG.

Rival technology types

Apart from vanadium as the electroactive medium, the zinc-bromine technology is the second in the rank of adopted technologies.

Technically different from vanadium-

based RFBs, the zinc-bromine battery (ZBB) is based on a solid zinc electrode and a liquid bromine electrolyte, which gives this technology a higher energy density than VRFBs. Analysts noted that with the Australian Redflow this technology is slowly acquiring its share of the flow battery market.

All-iron Redox flow batteries are another rival technology. Developed by the American company ESS Inc., the promising all-iron RFB is characterized by the use of iron as electroactive species in both electrolytes (catholyte and anolyte). The low-cost iron-electrolyte brings a large advantage in terms of cost, although other limitations, such as hydrogen evolution, affect these kinds of batteries.

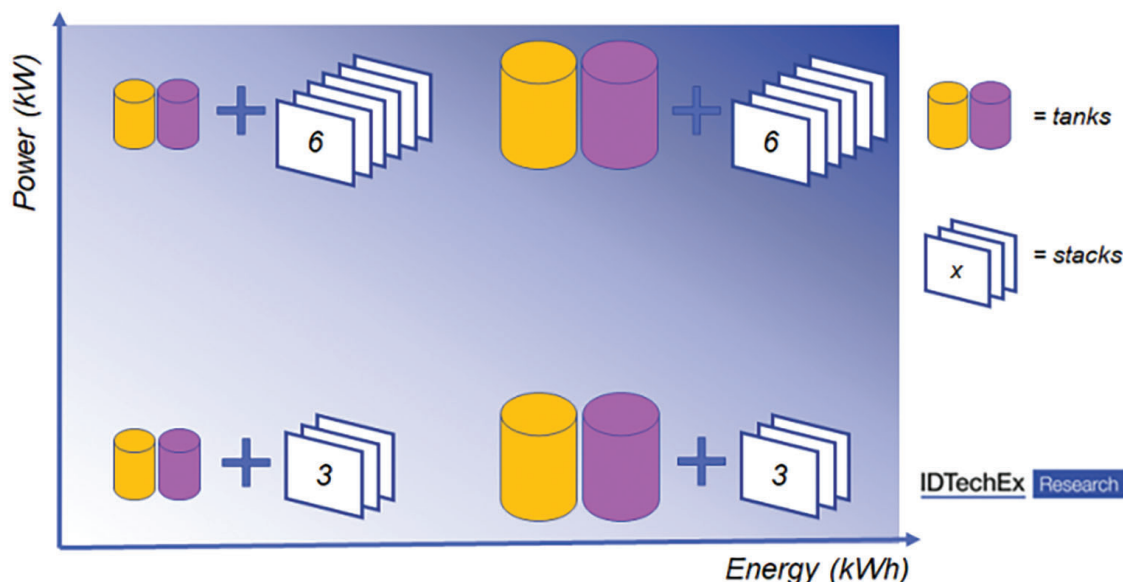
Organic flow batteries, yet another type, are technically similar to a Vanadium-based RFB but employing an organic electrolyte. “While the vanadium flow batteries employ an inorganic electrolyte based on vanadium salts, the ORFB – or sometimes called ‘Metal-free Flow Battery’ – are based on organic electrolytes such as quinone, pyridine, or ‘TEMPO’ (2,2,6,6-tetramethyl-1-piperidinyloxy) molecules,” analysts explained. Various companies are developing this kind of flow batteries, including the German Jena Batteries and the French Kemwatt.

Hydrogen-bromine flow battery

Already on the scene for a few years, the hydrogen-bromine flow battery is one of the future redox flow batteries that are now rapidly approaching commercialisation on a wider market.

The Dutch company Elestor is developing his technology, and in 2019 received a multi-million capital boost from Koolen Industries and EIT Innoenergy, already an earlier investor in Elestor.

The Dutch company is involved in the European MELODY project, related to the development of a sustainable redox flow battery technology that can effectively reduce the costs of electricity storage to support large-scale.



RFB decoupled power and energy capacity. Source: IDTechEx

Flow batteries could get cheaper thanks to MIT research

Unlike rechargeable lithium-ion batteries, flow batteries use large tanks of liquid to store energy which has made the technology “prohibitively expensive” because it relies on pricey electroactive metal salts. Researchers at the MIT are working on alternative approaches that use less expensive electroactive materials derived from organic compounds.

Batteries are increasingly in demand to store the power intermittently produced by wind turbines and solar panels, hence they are vital to reduce the world’s reliance on fossil fuels.

Converting CO₂ into a fuel

“The backbone of our global energy economy is based upon liquid fossil fuels right now, and energy demand is increasing,” he says. “The challenge we’re facing is that carbon emissions are tied very tightly to this increasing energy demand, and carbon emissions are linked to climate volatility, as well as pollution and health effects,” he said Fikile Brushett, an MIT associate professor of chemical engineering. His lab also works on new processes for converting CO₂, a waste product and greenhouse gas, into useful fuels.

Fellow MIT professor Ju Li is following a two-part A+B approach: “A’ is for action, which means rapidly scaling up proven technologies such as nuclear power and battery

energy storage that we know can work at the terawatt scale required to reduce CO₂ emissions drastically before mid-century,” says Li. “B’ is for baby technologies, like advanced fission and fusion reactors, and quantum computing, new technologies that we must nurture today so that they are ready in 20 to 30 years.”

Techno-economic modelling

In this context, Prof Brushett’s approach of “techno-economic modelling” might come in handy: His team evaluates the potential new technologies, to help them assess what aspects of the technology need the most improvement to make them economically feasible.

“With techno-economic modelling, we can devise targets for basic science,” he says. “We’re always looking for the rate-limiting step. What is it that’s preventing us from moving forward? In some cases it could be a catalyst, in other cases it could be a

membrane. In other cases it could be the architecture for the device.”

In the nuclear energy arena, for example, Prof Li is developing robust, carbon-nanotube and nanowire strengthened metallic nanocomposite materials that can survive high-dose radiation and high temperature; 3D printing of refractory alloys; and materials crafted from ceramic-zirconium crystal that could serve as a thermal superinsulator, taking heat up to 1,400 degrees Celsius.



View into Prof Brushett’s lab at the MIT

Toshiba’s new lithium-ion battery runs at -30°C

Toshiba has developed an aqueous rechargeable lithium-ion battery in a bid to realise the world’s first large-scale battery that can operate at -30°C. The high durability battery has over 2,000 charge- and discharge-cycles and by using water as aqueous electrolyte, it is safe even if exposed to fire.

Lithium-ion rechargeable batteries (LIB) have a high energy density but have an issue with safety. LIB achieves their high energy density by using a flammable organic solvent with a wide stable voltage window as the electrolyte. This flammability often restricts where storage batteries can be installed.

Batteries used to be made safer by replacing the usual graphite anode with a

non-flammable lithium titanate oxide which insulates the battery against shock and vibration. Moving beyond this, Toshiba developed a battery that uses an aqueous electrolyte.

Reducing fire risk broadens the scope of locations where the battery can be installed, Toshiba pointed out. It is now possible to consider installation near residential areas and inside office buildings, a factor that will

contribute to more widespread use of large-scale storage batteries.

New structure suppresses H₂ at the anode

Electrolysis of aqueous electrolyte usually degrades battery and cycle performance. Toshiba has overcome this with a new battery structure that combines a solid electrolyte separator and an electrolyte with a high concentration of lithium salt.

This approach prevents hydrogen ions (water molecules) migrating from the cathode to the anode, suppressing the electrolysis. The number of charge and discharge cycles has been increased to over 2,000, nearly 10 times higher than is possible with current technology, while achieving a voltage of 2.4V.

The new battery adopts an aqueous electrolyte that does not freeze and realizes charge and discharge at a temperature as low as -30° C. The aqueous electrolyte not only improves operational safety but also reduces costs by simplifying the safety requirements during the manufacturing process.

Current Technology

A voltage of over 2V increases electrolysis of water, impeding battery operation.

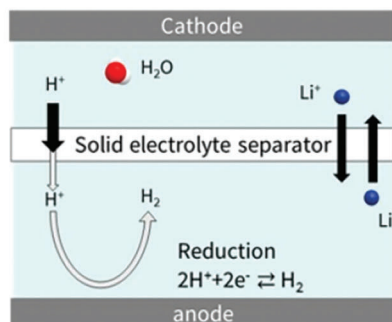


Image of an LTO anode during charging of a typical battery

A large volume of hydrogen is generated on the anode during charging.

New Battery Technology

Toshiba has successfully suppressed generation of hydrogen on the anode, even at over 2V.



Representation of the new technology

How Toshiba’s new battery works

Siemens Energy to supply F-class gas turbine for CHP in Guangdong

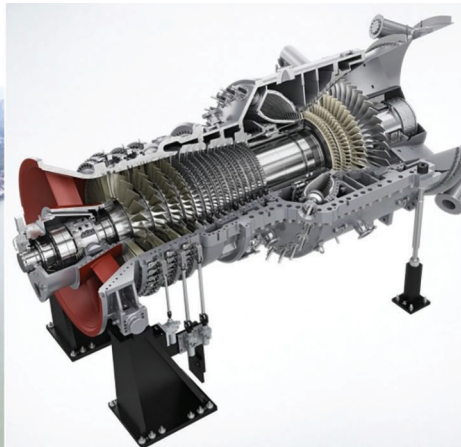
Guangdong Energy Group has commissioned Siemens Energy to supply two SGT5-4000F gas turbine units for the Zhaoqing Dinghu Combined Heat and Power (CHP) project. Situated in Zhaoqing City in China's southern Guangdong Province, the project is scheduled to start operation in 2023.

The CHP project is part of wider plans by the Chinese government to optimise the power generation infrastructure of the Guangdong-Hong Kong-Macao Greater Bay Area. The city of Zhaoqing – home to over 4 million people – has a well-developed transport network with eight external ports and three industrial clusters valued over RMB100 billion (\$15.46 billion) on new energy vehicles, advanced equipment manufacturing and energy conservation.

The gas-fired CHP will have an estimated annual power output of 3.5 billion kWh at a combined-cycle efficiency of over 60% per

unit and a capacity to reduce emissions by up to 60%, compared to coal-fired units. It will not only provide clean electricity to the grid, but also supports the heating demand of the industrial clusters in the wider Zhaoqing area by replacing scattered small boilers.

"A modern energy supply system for the Greater Bay Area is an important step towards China's 2060 carbon neutral goal and we look forward to our continued cooperation with Guangdong Energy Group in this direction," said Karim Amin, Executive Vice President Generation at Siemens Energy.



NEWS NUDGES

Duke Energy claims natural gas is cheaper than energy storage

Duke Energy Progress and Duke Energy Carolinas have both indicated in their latest integrated resource plans (IRPs) they view battery storage as potentially more costly than proven gas-fired generating technology. Market observers noted, however, that Duke's estimates peg the capital costs of a 50 MW/200 MWh energy storage plant at \$347 per kWh – far higher than the cost of units that entered commercial service in 2020, as per Lazard data.

CCGT units with side air intake

Once commissioned, the Zhaoqing CHP will be the first of its kind worldwide equipped with gas-steam combined cycle power units that have an elevated operation platform layout and mirrored side air intake system.

The 2x460MW class gas-steam CHP units, in turn, consist of two SGT5-4000F gas turbines, two steam turbines, four generators, two SPPA-T3000 control systems and auxiliary equipment.

Siemens Energy, spun off from Siemens AG in September 2020, has sold and installed more than 350 50Hz F-class gas turbine units worldwide, with equivalent operating hours exceeding 17 million hours. The company's F-class gas turbines debuted in the market in 1996 and have 25 years of operational experience. ■

Non-coal plants generate half of China's electricity supply

Strong growth in renewables has reduced the share of coal in China's power generation mix to less than 50% - for the first time. Fitch Ratings expects the contribution of coal will fall by a further 3% in 2021 as the government pushes for a coal-to-gas switch to reach carbon neutrality.

Traded volumes of wholesale power keep growing and reached 42% of China's entire electricity consumed in 2020. Analysts noted "this has led to lower average tariffs for leading coal-fired power gencos. Though price pressure has been somewhat alleviated by narrowing discounts due to more rational market competition throughout the year, and the robust power demand rebound and coal price hike in the fourth quarter of 2020."

State-owned power gencos with large amounts of natural gas-fired or renewables capacity in their fuel mix tend to have higher electricity prices, despite the expanded power trading. "This is because the price pressure from trading is offset by a

higher share of generation from wind and solar power, which charges higher tariffs than coal-fired power," analysts explained.

Strong rebound in electricity demand

China has been one of the first countries to emerge from the Covid-19 crisis, and industrial energy demand rebounded strongly starting from the autumn of 2020. As a consequence, power consumption from industry soared by 7.6% year-on-year the fourth quarter, while commercial sector demand was up by 8.4%, pushing up full-year demand growth to 3.1%.



Panda-shaped 50 MW solar PV project in Datong, China.

Growth accelerated throughout the winter 2021/21, supported by a robust economic recovery and the unusually cold conditions that boosted thermal coal and gas demand for heating. ■

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