

The Big Read **Batteries**

China's bigger, better batteries

It's the world's fastest-growing power technology — and Beijing is dominant



Solar panels at the CATL Luoyang base in Henan province. The company's battery systems can store solar power long after sunset © Zhang Yixi/VCG/Reuters

Simon Mundy in Ningde

Published 21 HOURS AGO

On a production line in south-east China, machines paste a black slurry of electrode material on to a copper ribbon just five microns thick — one 20th of the width of a human hair.

Further down the line, a team of robots monitored by an AI quality inspection system will turn the strips into battery cells by cutting them with lasers, winding them into rolls and pressing them with a force equivalent to a 23-tonne weight.

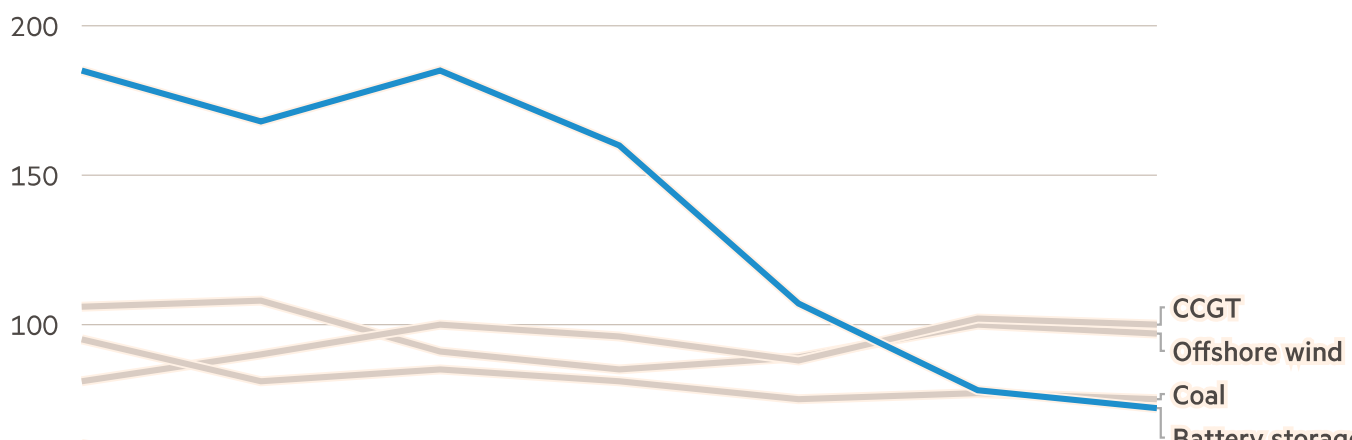
The factory is at the Ningde headquarters of CATL, the world's biggest battery producer and a goliath in the electric car industry.

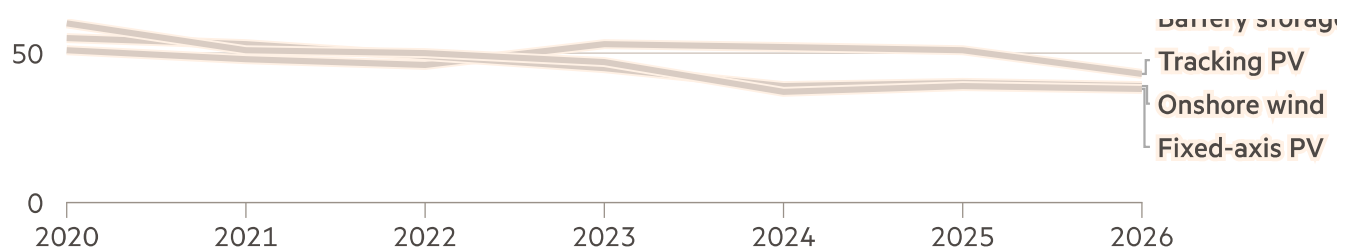
But the large-scale storage batteries these cells will go into are destined not for the world's roads but for the energy sector. They represent the fastest-growing power technology today, according to the International Energy Agency, the world's energy watchdog.

By driving down battery costs and improving the underlying technology, CATL and other Chinese manufacturers have provided an answer to a longstanding problem with solar and wind energy: their intermittency — or, simply, the fact that they only generate power when the sun shines or the wind blows.

Battery storage costs have fallen sharply

Global benchmark levelised cost of electricity (Constant 2025 \$ per MWh)





FINANCIAL TIMES

Source: BloombergNEF • 2026=estimate; CCGT=combined-cycle gas turbin

Systems using Chinese batteries are now able to store solar power long after sunset, for example, eroding the need for fossil-fuel generation that until now has ensured round-the-clock electricity supply.

“This is the big one,” says Michael Liebreich, a veteran energy analyst and consultant. Reliance on intermittent wind and solar power for the majority of electricity supply seems implausible, he says, “until you realise you have cheap batteries”.

The cost of battery packs used in grid-scale storage systems fell by 45 per cent last year alone, according to think-tank Ember. This year, prices have edged upwards because of tight global supplies of lithium. But the storage capacity of large-scale batteries installed around the world is today 11 times greater than the level five years ago, says the IEA.

Momentum around renewable energy investment has quickened as countries smart from the soaring cost of natural gas due to the US war with Iran and in anticipation of demands from data centres. This year, 40 per cent more large-scale batteries are set to be installed than in 2025, according to analysts at S&P Global.





The production line at CATL's factory in the south-east Chinese city of Ningde in 2018, seven years after the company was founded © Imagine China





Workers assemble electric vehicle battery modules last year in east China's Jiangsu province. Today, CATL produces two-fifths of the world's EV batteries © Xinhua/Shutterstock

But the power storage boom has brought energy security worries of its own. Governments from Washington to Brussels are wary of their reliance on Chinese-made equipment. Chinese producers account for 95 per cent of large-scale storage batteries, says Benchmark Mineral Intelligence.

The sector's rapid growth is strengthening China's position as the dominant force in low-carbon energy, compounding opportunities for Chinese companies in adjacent markets such as wind and solar generation equipment.

It is also changing power systems around the world. "We see, in all our scenarios, transitions towards systems based on renewable energy," says Brent Wanner, head of the power sector unit at the IEA, whose long-term energy market modelling is closely watched by governments and investors. "Battery storage is kind of the glue that can hold [such systems] together."

China's battery surge

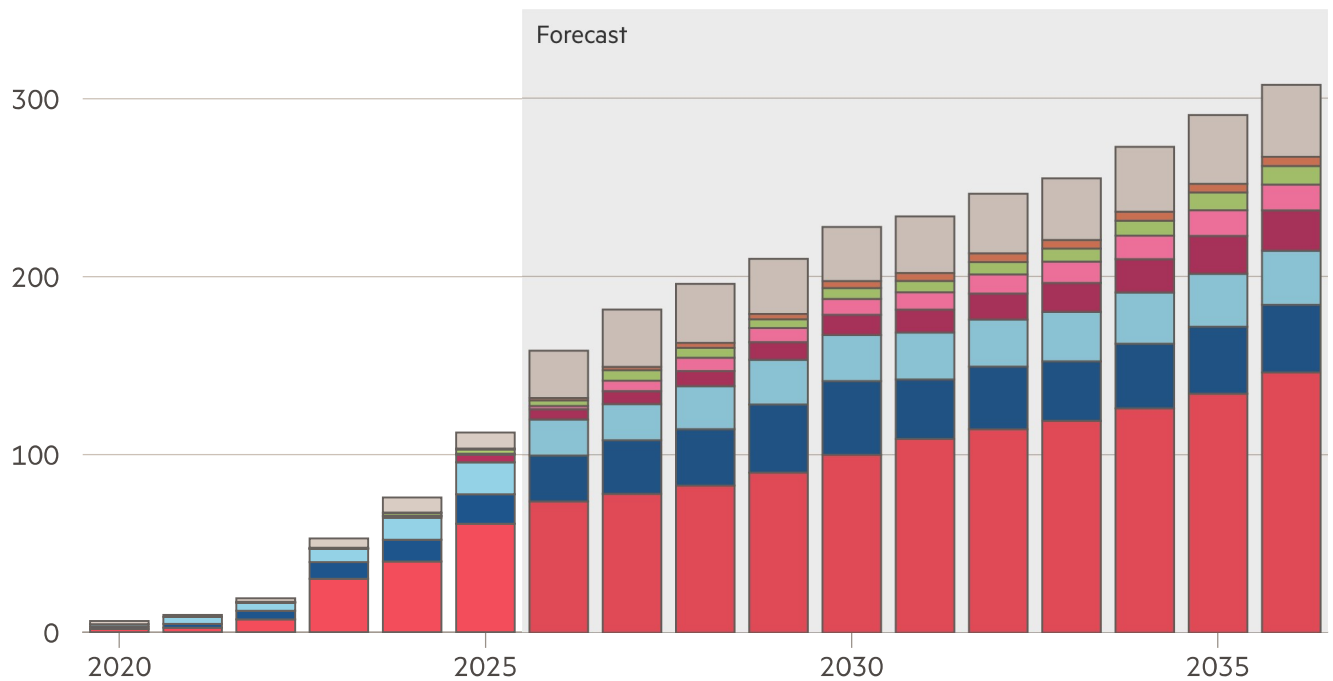
The seeds of China's battery storage boom were sown in the years after Xi Jinping took power in 2012, with his pledge to build an "ecological civilisation".

The government increased support for renewable power investment in an effort to boost energy security, tackle urban pollution and gain a strategic advantage in a sector with global growth potential. Solar and wind generation duly soared, supporting manufacturing capacity gains and cost declines that fed a global rush of renewable technology installations.

China is adding battery storage capacity faster than the rest of the world

Global energy storage additions by market (GW)

☐ China ☐ Europe ☐ US ☐ Sub-Saharan Africa ☐ India ☐ Mena ☐ South-east Asia ☐ Other

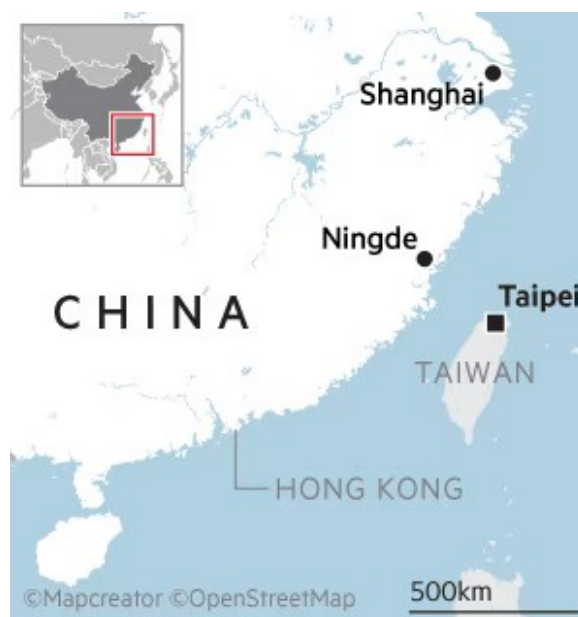


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Source: BloombergNEF • excludes pumped hydro plant

At the same time, China's government started giving out hefty subsidies for electric vehicles, aiming to capitalise on the country's battery prowess and to build strength in the automotive sector, where it had long struggled to compete.

This fuelled the rise of CATL, a company established in 2011 to make batteries for EVs, based in Ningde, an obscure fishing town close to where founder Robin Zeng grew up.



Today, the company produces 40 per cent of the world's EV batteries. Plug-in vehicles now account

for nearly two-thirds of new passenger car sales in China.

But that is only one part of the batteries sector. By 2021, it had become clear to the Chinese state that a vast amount of renewable power was being wasted, with solar and wind plants often generating far more electricity than the grid could absorb.

So it launched a strategic push to deploy battery storage on the grid at large scale. Across much of the country, developers were required to build or commission large-scale storage as a condition of approval for new wind and solar plants.

Again CATL has been at the forefront of this effort. Its fastest-growing business line today is the production of cells for large-scale energy storage systems. The company accounted for 22 per cent of cell sales for these systems globally in the first half of the year, making it the market leader in China and abroad.

As a result of the state's drive, China's battery storage capacity expanded from 2.4 gigawatts in 2020 to more than 140GW at the end of last year, according to the Energy Institute, an industry membership body. In the first half of this year, coal's share of Chinese power generation fell below 50 per cent for the first time ever.





CATL's headquarters in Ningde, once an obscure fishing town close to where the company's founder grew up © Qilai Shen/Bloomberg



This year the city, in the north-east of Fujian province, came third in a UN ranking of the world's most 'innovation-intensive' places © Qilai Shen/Bloomberg

Exports of China's large-scale battery technology have also surged. Researchers at BloombergNEF estimate that new battery storage capacity of 84.6GW will be added outside China this year — 65 per cent higher than last year.

“It is absolutely a global trend,” says Jeh Vevaina, chief investment officer for energy at the asset manager Brookfield. “We’re seeing it in all our markets, be that in Europe, the US, Asia — really everywhere we do business.”

On a vast stretch of sun-baked desert south of Abu Dhabi, construction is under way on a \$6bn power plant designed to provide a power output of 1GW — equivalent to the average demand of more than 2mn European homes — around the clock. A huge battery array, installed by the Chinese companies BYD and Sungrow, will soak up excess solar power during the day from millions of panels stretching over 90 square kilometres, discharging it after dark.

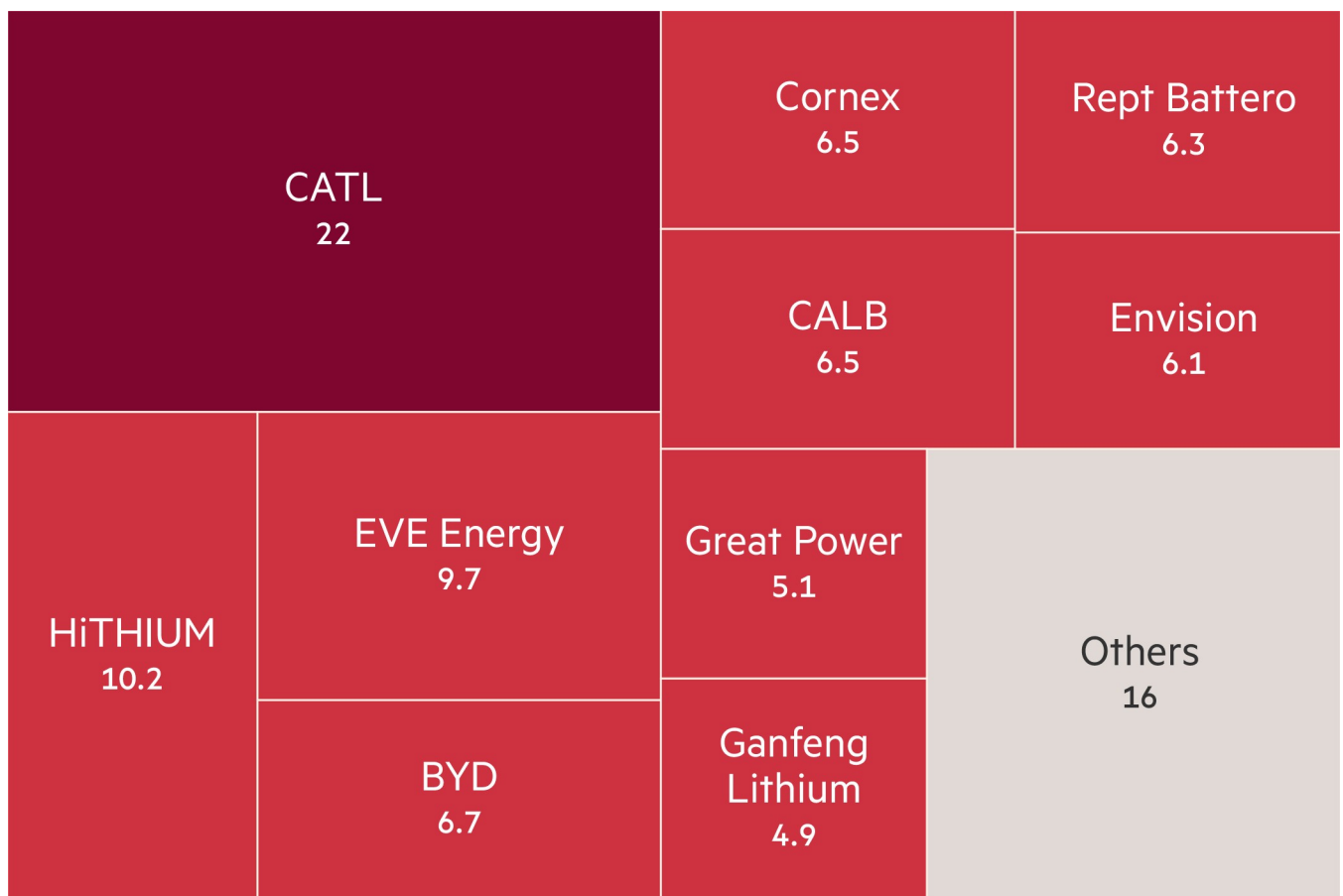
The plant's developer, state-owned clean energy company Masdar, is presenting it as a blueprint for similar projects elsewhere — opening the prospect for a greater uptake of low-cost renewable power than had previously seemed possible, and weakening the case for continued investment in fossil-fired plants to provide 24-hour “baseload” power.

“We have always been challenged, as an industry, by the fact that renewables are intermittent,” says Masdar chief executive Mohamed Jameel Al Ramahi. “This project demonstrates the ability for renewables to become a baseload solution.”

In May, the International Renewable Energy Agency, an organisation with more than 170 national governments as members, found that the cost of hybrid power plants that combined renewables and storage had fallen so much that in many parts of the world they could provide a “firm” round-the-clock power supply, matching the typical level of reliability achieved by fossil-fired plants at an equivalent or lower cost.

CATL leads suppliers of battery energy storage cells worldwide by a large margin

Share of world BESS cell shipments, H1 2026 (%)



FINANCIAL TIMES

Source: Benchmark Mineral Intelligenc

In India, the government in August held an auction for renewable power delivered round the clock, with bidders required to match the typical supply of coal plants. It secured 1GW of solar and storage capacity at a lower cost than recent coal power contracts.

Chinese-made batteries are now being deployed en masse in the country, which in the first half of this year added seven times as much new power storage as it had in total at the end of 2025, according to energy research company Mercom India. Much of the rise comes from a single huge solar and storage project built by the Adani Group, whose founder Gautam Adani has pledged to support Prime Minister Narendra Modi's clean energy drive.

The government is now planning regulation that would require storage to be installed alongside new solar and wind power plants — similar to the rules that drove China's storage lift-off. Climate advocates hope this will reduce the country's heavy reliance on coal, the most carbon-intensive fossil fuel.

"Give it another two or three years . . . when all this gets set up, then you can start seeing a decline

in the requirement for coal-based power,” says Sumant Sinha, chief executive of ReNew, one of India’s largest green energy developers.

‘The equipment is safe’

China’s battery makers are now firmly in the ascendancy.

Ningde came third this year in a UN World Intellectual Property Organization ranking of the world’s most “innovation-intensive” places, sandwiched between the UK’s Cambridge and the Boston-Cambridge cluster in Massachusetts. The accolade reflects the more than 60,000 patents filed by CATL, exceeding the combined total of its biggest rivals. Zeng, meanwhile, is China’s fourth-richest person with a fortune of \$50bn.





CATL's Jianxiawo lithium mine in south-east China. Improvements in lithium-ion technology are boosting the duration for which storage systems can provide power © Gilles Sabrie/Bloomberg



A wind farm with battery storage facilities made by CATL in Germany. There have been concerns in Europe of excessive reliance on imports from China © Alamy

Yet CATL and others now risk becoming victims of their own success. As the technology has seemed increasingly crucial to the renewables transition, officials in major markets have grown alarmed by the dependence on supply from a single country — and the potential for interference from Beijing.

Early in September, Ford chief executive Jim Farley received a strongly worded letter from US transportation secretary Sean Duffy, voicing “profound concern” over the carmaker’s partnership with CATL.

During Joe Biden’s presidency, Ford had started investing heavily in EV technology, only for Donald Trump to return to power and scrap Biden’s industry-supporting policies.

In December, Ford announced that it would use its idle car battery capacity as the foundation for a \$2bn push into a new business line: stationary battery storage systems, which it would produce under a licensing agreement with CATL. “There is no doubt that the growth for battery storage . . . is exploding,” Farley said in August.

Ford’s strategy has now run into government opposition. Duffy’s letter warned against “reliance on technologies of foreign adversaries”. It is the latest instance of Washington’s resistance to the incursion of Chinese technology, following prior crackdowns on companies from telecom infrastructure provider Huawei to the social media app TikTok.

In August, Trump authorised the energy department to block Chinese-linked battery storage equipment from the US grid on national security grounds. Washington has also revised the rules around tax credits for battery storage, in effect limiting the amount of Chinese equipment American companies can use.

Some US officials say that Chinese-made storage equipment could potentially contain chips enabling it to be controlled or switched off remotely. Similar worries have emerged in the EU, where the authorities have moved to restrict public funding for storage projects using certain key components from “high-risk” countries including China.

Such concerns are baseless, says Cao Renxian, the billionaire founder of Sungrow, one of the world’s biggest providers of large-scale battery systems. “It is a trade issue, not a safety issue,” Cao says, at his headquarters in China’s eastern Anhui province. “We all know that the equipment is safe.”

Like battery sector peers including CATL and BYD, Sungrow is seeking to address European worries of excessive reliance on imports from China by building up large-scale manufacturing operations on the continent. In the US, however, it is forecasting a gradual decline in sales as

restrictions tighten.

The US crackdown will force a growing reliance on kit made by alternative suppliers such as South Korea's Samsung SDI and LG Energy Solution, whose storage batteries are significantly more expensive, says Anna Darmani, a battery storage analyst at Wood Mackenzie.



CATL's fastest-growing business line today is the production of cells for large-scale energy storage systems





The company's founder, Robin Zeng, attends a launch event for some of its latest battery technologies in Xiamen, Fujian province © Ng Han Guan/AP

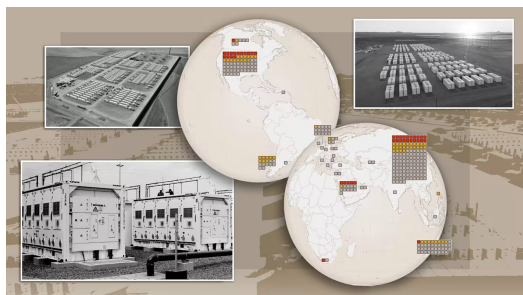
The US government's Energy Information Administration still forecasts that battery storage capacity in the country's grid will continue to soar, doubling between 2025 and 2027, as utilities try to meet rising power needs from data centres. Battery storage is “the main lever left to pull to meet new demand”, says Andy Bowman, chief executive of Jupiter Power, one of the country's biggest storage project developers.

The AI power rush has exposed the limitations of today's battery storage technology. US data centre developers are also investing in on-site generation — most of which is in the form of gas power, despite the falls in the cost of renewables and batteries.

“Not everywhere do we have the right combination of renewable resources and land footprint that's required to build out large amounts of renewables plus storage,” says Lucia Tian, Google's director of advanced energy technologies.

Another concern is the fact that lithium-ion battery storage systems are typically designed to provide power for only several hours at a time — meaning it can be “economically challenging” to build enough capacity to fully guard against periods of unusually weak solar or wind generation, Tian says.

Visual story



How mega batteries are unlocking [an energy revolution](#)

All the same, Tian adds that Google will use renewable and storage plants to provide much of the power for its new data centres. It will also invest in alternative “long-duration” storage technologies that could provide power for much longer periods. It has commissioned storage projects from Form Energy, which uses reversible iron rusting to store energy for up to 100 hours at a time, and Italy’s Energy Dome, whose system uses compressed carbon dioxide.

China’s battery makers, however, insist that some of their biggest advances are still to come.

Last month CATL began commercial deliveries of power storage units with batteries that use sodium — an abundant mineral — instead of lithium. “When the production volume goes up, we expect it will be much cheaper than lithium,” says Ni Jun, CATL’s chief manufacturing officer.

Improvements in lithium-ion technology are also increasing the duration for which storage systems can provide power.

In June, the Shanghai-based Envision Group launched a new system designed to provide up to 16 hours of storage, compared with the roughly four-hour capacity that is currently standard on the market. The company is developing in Inner Mongolia what it says will be China’s largest AI data centre, to be powered by on-site renewable energy and battery storage.

Envision founder Zhang Lei argues that such projects provide a model for the rest of the world — if it can overcome what he sees as an irrational fear of reliance on Chinese-made equipment.

For creating energy technology that is “not only sustainable but also extremely cost competitive”, Zhang says “China deserves respect”

Zhang says, 'China deserves respect'.

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