



# Long power, short chips – China's electrostate advantage

Ninety One Global Environment research

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### Key takeaways

- China’s AI ambitions are reshaping its energy system and related supply chains, creating new opportunities for investors in clean-tech and decarbonisation broadly.
- We see better opportunities in China’s wind sector than solar, reflecting wind’s improving economics and strong policy support.
- Other growth areas include energy storage systems, which are becoming increasingly central to China’s energy system, and the technologies needed to deliver high-density power for AI datacentres.

China’s renewable-energy landscape is evolving in ways that reflect a broader strategic objective: ensuring energy abundance to support the rapid build-out of AI computing infrastructure. The country, sometimes described as the world’s first ‘electrostate’, is reshaping its energy system and related supply chains in a concerted effort to secure a long-run comparative advantage in AI by creating an abundant supply of low-cost electricity.

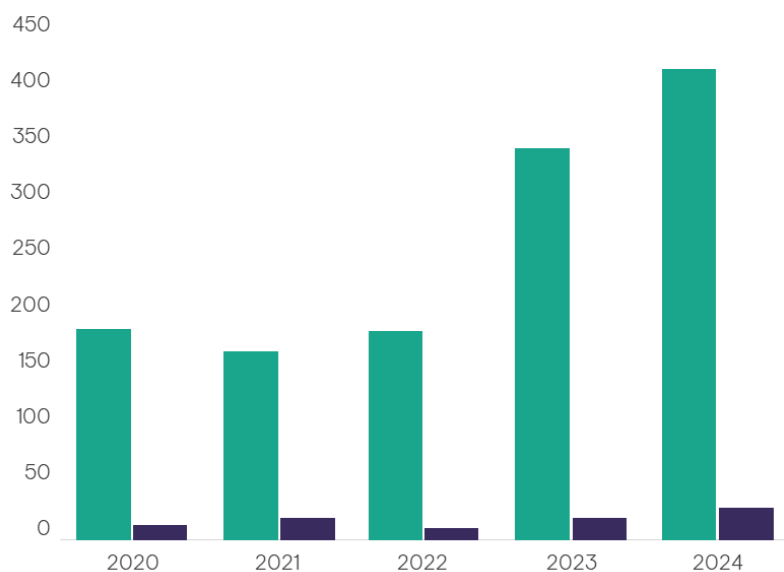
This shift is occurring against the backdrop of rising demand in China for AI computing capacity, but limited access to leading-edge chips. US restrictions on NVIDIA exports to China have incentivized the build-out of a local advanced semiconductor manufacturing supply chain: new data centre projects that receive state funds are required to use domestically developed AI chips. However, due to equipment constraints (such as on extreme ultraviolet (EUV) lithography machines), China is not yet able to produce graphics processing units (GPUs) that compete with the leading US technology.

The evolution of clean-tech sectors in China reflects this ‘long power, short chips’ dynamic. The strategic priority is to maintain the competitive advantage of abundant electricity, while closing the GPU technology gap – an effort that has implications across the renewables and decarbonisation value chain. Our latest on-the-ground research, from which we present highlights here, includes insights into the evolution of wind vs. solar in China, the acceleration of energy-storage deployment, and the growing importance of advanced power-electronics infrastructure such as high-voltage DC (HVDC) systems and solid-state transformers (SSTs).

### Power as strategy: China’s AI build-out and energy abundance

In the first nine months of 2025, China added over 300GW of new renewable capacity, with wind and solar generation increasing by more than the growth in total national electricity demand. This shows that China is deliberately building power capacity well ahead of its immediate needs.

Figure 1: China and US YoY increase in total electricity generation capacity (net capacity added)



Source: Jefferies, 2025.

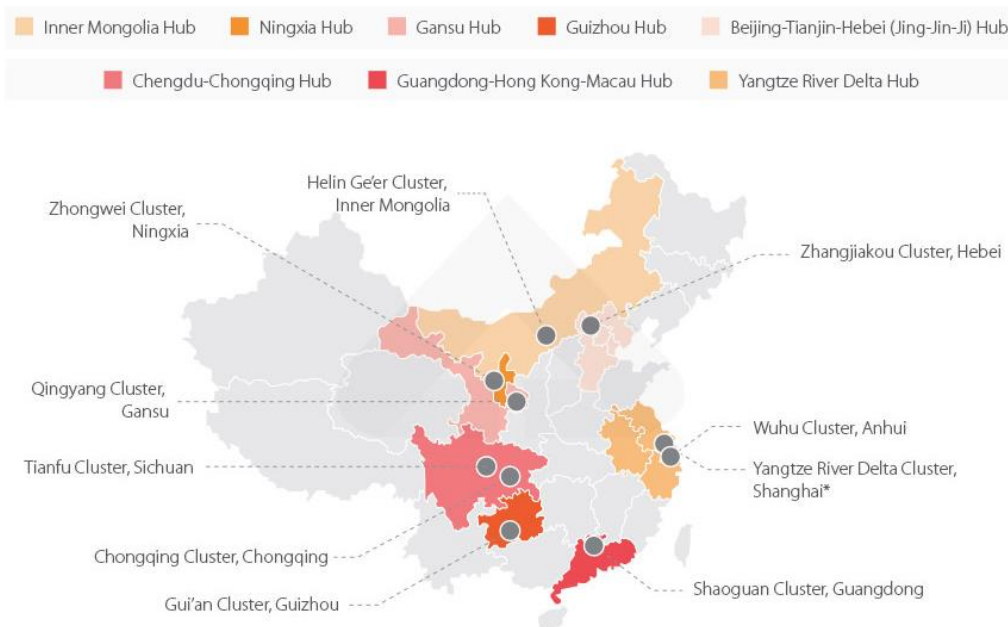
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As a result, China can deploy data-centre infrastructure at scale, aided by ample land availability, short permitting timelines and extensive transmission build-out. This is in contrast to the US, where power scarcity and long equipment lead-times increasingly constrain the pace of AI infrastructure growth. This issue has been acknowledged by the AI hyperscalers, with Microsoft CEO Satya Nadella stating, “the biggest issue we are now having is not a compute glut, it’s power.” Amazon CEO Andrew Jassy has also flagged power as the major bottleneck to AI development.

China’s strategic focus on adding renewables to compete in the AI race is shaping the locations of datacentres. The government has designated eight national computing hubs and 10 datacentre clusters, many sited in regions with large wind and solar bases. These clusters can draw on abundant, low-cost renewable generation, supported by expanding HVDC capacity and increasing use of power-electronics systems designed to maintain stability in an energy system with high renewables penetration. In regions such as Inner Mongolia, new datacentres are being directly linked to renewable bases with co-located energy-storage systems, providing both physical proximity to power and high utilisation rates for the new infrastructure.

Our conversations in China have highlighted that this trend is reinforced by the government’s drive for at least 80% of the power for new data-centres to be generated from renewable sources (NDRC, Special Action Plan for Green Low-Carbon Development of Data Centres<sup>1</sup>). As a result, the key performance indicators used in China are shifting from ‘power usage effectiveness’, which evidences the energy efficiency of data centres, to ‘carbon usage effectiveness’, which incorporates both energy use and the carbon footprint of the energy source. This change highlights the political drive to balance digital expansion with emissions control.

**Figure 2: Locations of computing hubs and data centre clusters**



Source: China Briefing, March 2022.

## China’s renewable-deployment pivot: wind growth accelerating, solar moderating

2025 was the final year of China’s 14th Five-Year Plan. As the end approached, state-owned utilities accelerated project completions to meet the capacity targets they had set for themselves (and those implicitly expected by policymakers). In the first nine months of the year, China added 310 GW of new renewable capacity, accounting for 84% of all power additions. Of this, 7 GW came from hydro, 61 GW from wind and 240 GW from solar.

On the generation side, renewable electricity output reached 2,900 TWh over the same period, an increase of 15% year-on-year, equivalent to about 40% of total power generation. Wind and solar together produced 1,700 TWh, or 22% of total output. The combined increase in wind and solar generation (380 TWh) was larger than the growth in total national power demand (360 TWh).

<sup>1</sup> The National Development and Reform Commission (NDRC) is a highly influential economic planning agency.

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The massive deployment of solar is changing the relative attractiveness of wind and solar development in China’s energy system. Solar installations remain large in absolute terms, but developers consistently say that project economics have weakened. Low single-digit internal rates of return (IRR) are increasingly common due to oversupply in the industry (which is being addressed). These return pressures are expected to cause a decline in Chinese solar demand this year and a shift in developer preference, with the government pointing to 20–30% growth in onshore wind over the next five years, equating to 30–40 GW. Offshore wind has become a particular focus, with >60 GW of additions planned over the same period, supported by strong policy direction, lower curtailment risk relative to solar, and improving cost visibility for developers. Overall, there is a more supportive market for wind developers in China.

### Energy storage and grid modernisation: supporting the next phase of growth

The rapid acceleration of energy-storage deployment, both at utility scale and within the residential and commercial segments, continues to present exceptional investment opportunities and is an area where our conviction has strengthened. Storage manufacturing and integration capacity is running at >85% utilisation, and several firms report export volumes doubling across both developed and emerging markets. The tightness of the market reflects not only broad global demand but also the increasingly structural role of energy storage within China’s domestic power system, particularly as the country expands AI-related electricity loads. The importance of ESS is reflected in policy, with emerging trading mechanisms and an increased willingness by the system operator to reward flexibility, meaning developers are now able to view ESS as a revenue-generating asset, underpinning demand.

Grid architecture is evolving in parallel, fostering a wave of innovation. Data-centre growth is accelerating adoption of high-voltage direct current (HVDC) distribution systems, which offer lower losses and greater power density than traditional alternating current (AC) architectures. Over the medium term, solid-state transformers (SSTs) appear the ultimate solution to deliver power from the grid into data centres with maximum efficiency. China’s grid-equipment firms have invested heavily in SST development and have already deployed multiple generations of prototypes capable of supporting high-density loads in the tens of kilovolts.

These technologies could play a significant role as AI workloads increase and as datacentres require larger blocks of power with higher efficiency. As described by one of the companies we met, “the Chinese grid is the most complex in the world and has the most extensive high voltage use cases. Therefore, leaders in Chinese grid systems by definition have the best know-how in handling high voltage”. As active investors, we believe that China’s focus on leading-edge electrification and resource-efficiency technology to support its AI roadmap creates compelling opportunities to identify Chinese manufacturers that are ‘out-innovating’ their Western peers but are currently underappreciated by the market.

### Investor implications

For investors, we would flag three key implications from this research<sup>2</sup>:

- Solar volumes remain large in China, but oversupply and weakening IRRs point to a more challenging outlook. Wind’s improving economics, policy support and clearer multi-year pipeline make it the more resilient segment.
- Energy storage is critical to China’s power system and is becoming increasingly important globally. Tight utilisation, rebounding global demand and new revenue mechanisms are turning ESS into the most attractive profit pool in China’s decarbonisation supply chain.
- China is building a meaningful lead in power-electronics manufacturing. Accelerating adoption of HVDC and the emergence of SSTs position Chinese manufacturers at the forefront of the technologies needed to deliver high-density power for AI datacentres.

Taken together, these dynamics show an energy system being aligned to maximise electricity availability at a strategic level. In a world where Western markets are constrained by power and China by access to high-end chips, these developments reinforce where the more durable investment opportunities sit for decarbonisation investors: storage and the grid-modernisation technologies that underpin China’s ‘long-power’ advantage.

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<sup>2</sup> Opinions based on current market conditions; subject to change without notice and without any obligation to update.

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