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China Energy Transition Review 2026

China's energy transition is moving toward "building while breaking," as its clean energy system begins assuming functions long performed by fossil fuels.

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About

This report examines how far China's clean energy transition has progressed, whether its momentum can be sustained and what China's trajectory means for the rest of the world. It moves beyond the familiar debate over whether China's clean energy build-out represents genuine transition or mere addition, asking instead whether clean electricity is beginning to take over the functions long performed by fossil fuels.

The analysis traces this shift across power generation, system flexibility and the electrification of industry and transport, and considers whether the transition can carry through its more demanding "building while breaking" phase, before setting out what China's progress means for how other countries approach their own energy choices. It draws on Chinese public data, international sources such as the International Energy Agency and World Bank and Ember's own datasets.

Read the report online at:
https://ember-energy.org/latest-insights/china-energy-transition-review-2026/

Highlights

17 of 26

Provincial-level regions tracked in this report where coal generation has turned flat.

26%

26% of China's new truck sales were electric in 2025, a share leading European markets have only just reached for passenger cars.

$220 bn

In 2025, China's clean technology exports surpassed USD 220 billion, bringing them closer in scale to the country's traditional export "old three": garments, furniture and household appliances.

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Towards “building while breaking”

China's energy transition is entering a more demanding phase, in which clean electricity begins to take over roles long held by fossil fuels across power generation, system balancing and the broader economy. New challenges come with it, and the near-term path is likely to be uneven as the policy toolkit adapts. But the momentum is increasingly anchored in a "growing-by-greening" dynamic that turns each step of the transition into a source of strength for the next. That is what should carry it through the rougher stretch ahead.

Two stories, one transition

China’s energy transition is often told in two very different ways. One points to the country’s world-leading expansion of wind and solar power, electric vehicles (EVs) and battery storage, viewing this as evidence that the transition is gaining real momentum. The other points to continued growth in coal-fired power capacity and argues that this is not a genuine transition, but simply addition – clean electricity being layered onto a fossil-fuel system that is still expanding.

The apparent paradox has deep roots. China’s economy, like many others, was built over decades around fossil fuels, with energy supply, industrial processes and transport networks all designed around their use. The scale of that dependence is why the transition is not a narrow energy switch but a broader economic shift – rebasing a large and complex industrial economy on a cleaner electric foundation, akin to repowering a massive ship while it is still at sea.

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Seen this way, the two stories are two views of a single process: the take-off phase of "building before breaking" (先立后破), in which the new system is building the scale and depth before it can carry more of the load and begin displacing the old.

A deeper shift is underway

So where does China stand in this process today? Is it still primarily expanding the new system alongside the old, or has the new system begun to put more direct pressure on the fossil-fuel system it is intended to replace?

Developments in 2025 and early-to-mid 2026 point to a deeper shift. The new system is beginning to take over functions long performed by fossil fuels — across power generation, system balancing and the wider economy.

In 2025, clean power met all of China's growth in electricity demand, pushing thermal generation, mostly coal-based, down for the first time in a decade. This is not a one-year anomaly: on a 12-month moving average, coal generation has been stalling since early 2024, after years of continuous expansion — a sign of a longer-term shift.

China's clean balancing architecture is scaling rapidly, led by a battery-storage surge: around 60% of the world's new battery storage was installed in China in 2025, an 84% year-on-year rise. Longer-duration options such as compressed-air and thermal storage are beginning to take off too. With average utilisation roughly doubling between 2022 and 2025, these are becoming a real source of clean flexibility, reducing the need to lean on coal.

On the demand side, electrification is taking root across the wider economy. In industry, it is already well advanced in light manufacturing — machinery, electronics, textiles — where electricity supplies about three-quarters of final energy, and is now reaching harder sectors like metals smelting and non-metallic minerals. In transport, China's rapid EV uptake in passenger vehicles is well known — but the shift is now moving fast into harder segments, with electric models already making up around a quarter of new truck sales.

The “old” system is beginning to register the shift

With that progress, the effects are beginning to show in the fossil-fuel system. In a country as large and complex as China, major change rarely starts in the national aggregate but emerges first across provinces and sectors.

At that level, multiple signs suggest that fossil-fuel peaking is increasingly coming into view. Coal generation is flattening in 17 of the 26 provincial-level regions tracked in this report, together accounting for more than half of national thermal capacity.

Fossil-fuel use has also fallen substantially from previous peaks in relatively easier-to-electrify manufacturing sectors such as machinery, textiles and food and beverages. These sectors account for a relatively modest share of industrial energy use compared with China’s energy-intensive sectors. More importantly for the next phase, early signs of flattening are now appearing even in these harder sectors, such as metals smelting and processing.

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Key takeaways

01 Clean power met all demand growth in 2025, and coal generation fell for the first time in a decade

Led by strong wind and solar growth, clean electricity met all of China's additional power demand in 2025 — pushing thermal generation down 0.7%, even as electricity demand rose 5%. This marks a significant departure from 2015, the last time thermal generation fell, which came under near-flat demand growth of about 0.5%. And 2025 is not an isolated result: coal generation has been flat on a rolling 12-month basis since early 2024, following years of continuous expansion.

02 Clean flexibility is moving beyond the margins, led by a battery storage surge

Battery storage has scaled at extraordinary speed, overtaking pumped hydro in installed capacity by the end of 2024, then growing a further 84% in 2025. It is also being used more intensively, with average utilisation roughly doubling between 2022 and 2025. The frontier is advancing too. Longer-duration storage options, particularly compressed-air and molten-salt storage, are moving from early demonstration towards commercial deployment.

03 Industry is electrifying even in its harder corners

Across equipment-intensive manufacturing, electrification has advanced quickly — accelerating after 2015 as the transition gained momentum — and electricity now supplies about three-quarters of final energy in light manufacturing sectors like machinery, equipment and textiles. Even the harder, energy-intensive sectors are now starting to move, with electricity's share rising in industries such as metals smelting and processing and non-metallic minerals.

04 Transport electrification is starting to go beyond passenger cars

Passenger EVs made up about 67% of new sales by June 2026. The shift is now reaching trucks, a more demanding segment to electrify. China's electric truck sales more than doubled in 2024, then again in 2025, lifting their share of new sales to 26% — matching what leading European markets have reached for passenger EVs.

05 Fossil fuel use is stalling across provinces and sectors

Coal generation is flattening in 17 of the 26 provincial-level regions tracked in this report between 2021 and 2025, and these regions together account for more than half of national thermal capacity. In the wider economy, absolute fossil fuel use has declined from its peak by a range of 26% to 71% across a range of light, easier-to-electrify manufacturing sectors, including textiles, machinery, and food and beverages. Even in metals smelting and processing, often considered hard to decarbonise, signs of fossil fuel use plateauing are emerging.

06 Economic growth is increasingly powered by the transition

Electrified transport displaces an estimated 1 million barrels of oil a day — equivalent over a year to roughly twice OECD Europe's government-held strategic oil inventories (179 million barrels at the end of 2025). Clean technology exports surpassed $220 billion USD in 2025, approaching the scale of China's established export engines: garments, furniture and appliances. And the clean economy, spanning clean energy investment, manufacturing and supply chains, generated an estimated USD 2.1 trillion in economic activity in 2025, on a scale comparable to major traditional sectors such

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Progress is bringing harder challenges, but momentum is firm

Progress brings harder challenges. Clean electricity must expand fast enough to meet rising demand and reach into the parts of the economy once thought beyond the reach of electrification. The legacy coal system must be managed as plants run fewer hours and coal-dependent regions face pressures that are now more structural rather than cyclical. In 2026 so far, this harder phase has already made the path bumpier: slowing solar additions, curtailment pressures and growing integration challenges tested the transition's momentum.

None of this is unusual. Major economic change is always demanding, and grows more so as it goes deeper. The test is not the scale of the challenges, but whether policy can adapt — and on that test, China's toolkit is visibly evolving. As new rules take time to bed in, some near-term unevenness is likely. For example, in renewable capacity expansion and investment. But as the transition reaches scale, it delivers real returns in energy security, industrial strength and economic growth. These benefits turn what might once have looked like an abstract policy mandate into concrete economic interests, strengthening the case and the appetite for pushing through the harder phase ahead.

The transition is no easier elsewhere. Increasingly, countries weigh their energy options as much on energy security, industrial strength and economic development as on climate imperatives — decisions that are likely to involve trade-offs and tough policy choices.

China's rapid progress may not have provided an answer that is immediately translatable to other countries, but it is undeniably changing the context for their decisions. As a large and complex industrial economy built over decades around fossil fuels, China had strong reasons to stay at the surface: expanding the clean energy system only where it offered immediate, easy economic returns. Yet the evidence points to the beginning of a deeper shift, with clean electricity progressively taking over functions once performed by fossil fuels. If an economy so deeply anchored in fossil fuels is transforming its energy foundation, the implications extend far beyond its borders.

Chapter 1

Deeper integration



For much of the past decade, China's massive renewable build-out acted mainly as an additional layer of supply, expanding alongside a fossil-fuel system that was still growing. That phase is now giving way to deeper integration, with clean electricity taking on a larger role in meeting power demand, balancing the electricity system and powering activity across the wider economy.

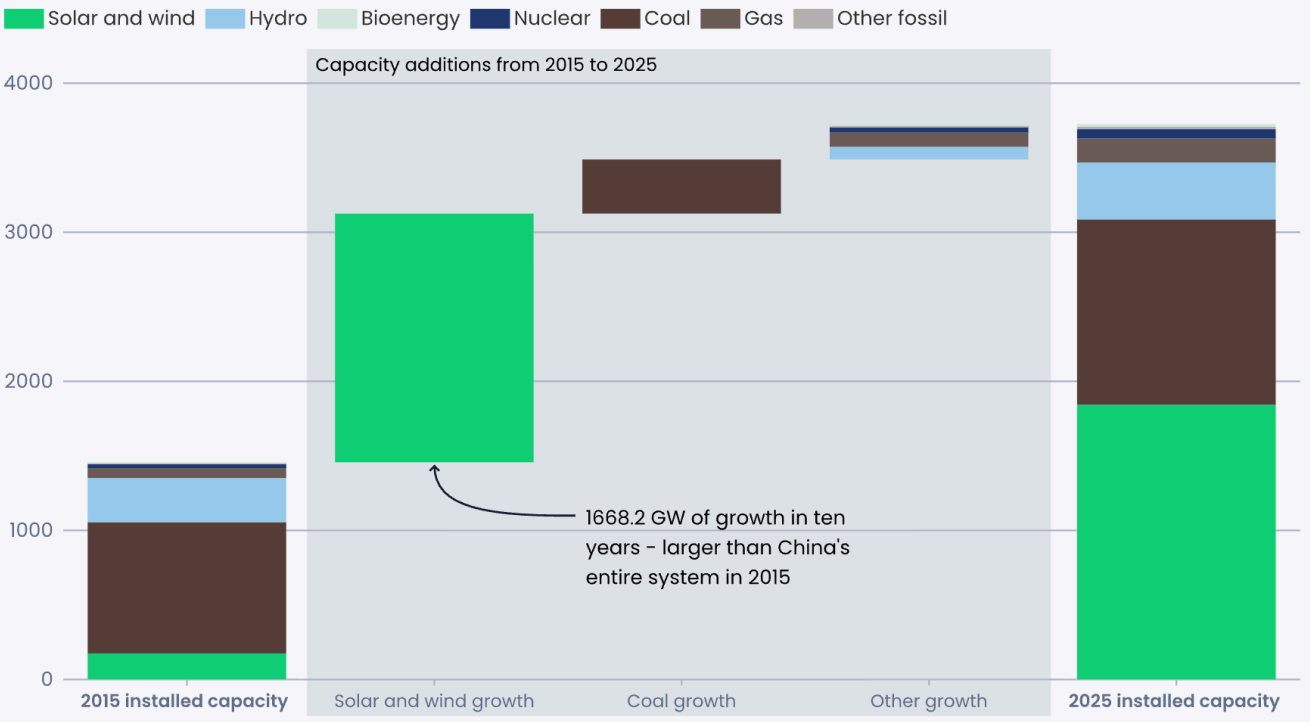
1.1 Generation: renewable build-out is changing the coal story

China has led the world in wind and solar additions for more than a decade. It already possessed the world's largest power system by 2015, with around 1,450 GW of total generation capacity. In the decade since, it has added almost 1,700 GW wind and solar — more than its entire 2015 system. Yet this progress has unfolded alongside another reality: coal remains the backbone of China's power fleet, and its capacity has kept growing through the renewable boom. This pattern of "more renewables, more coal" is now beginning to change.

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China added more wind and solar in the last decade than its entire 2015 power system

Installed capacity (GW)



Source: Yearly electricity data, Ember, Electricity Data Explorer
Other growth includes hydro, bioenergy, nuclear, gas and other fossil installed capacity growth

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A surge ahead of the 2025 pricing reform deadline, followed by an adjustment. Monthly wind and solar capacity additions fluctuate considerably over the course of the year, often culminating in year-end surges as developers complete projects ahead of annual targets and reporting deadlines. Viewed through a 12-month moving average, which smooths these short-term fluctuations, the change in the underlying trajectory becomes clear. The pace of expansion remained broadly stable through 2021 and 2022 before turning sharply upwards from 2023.

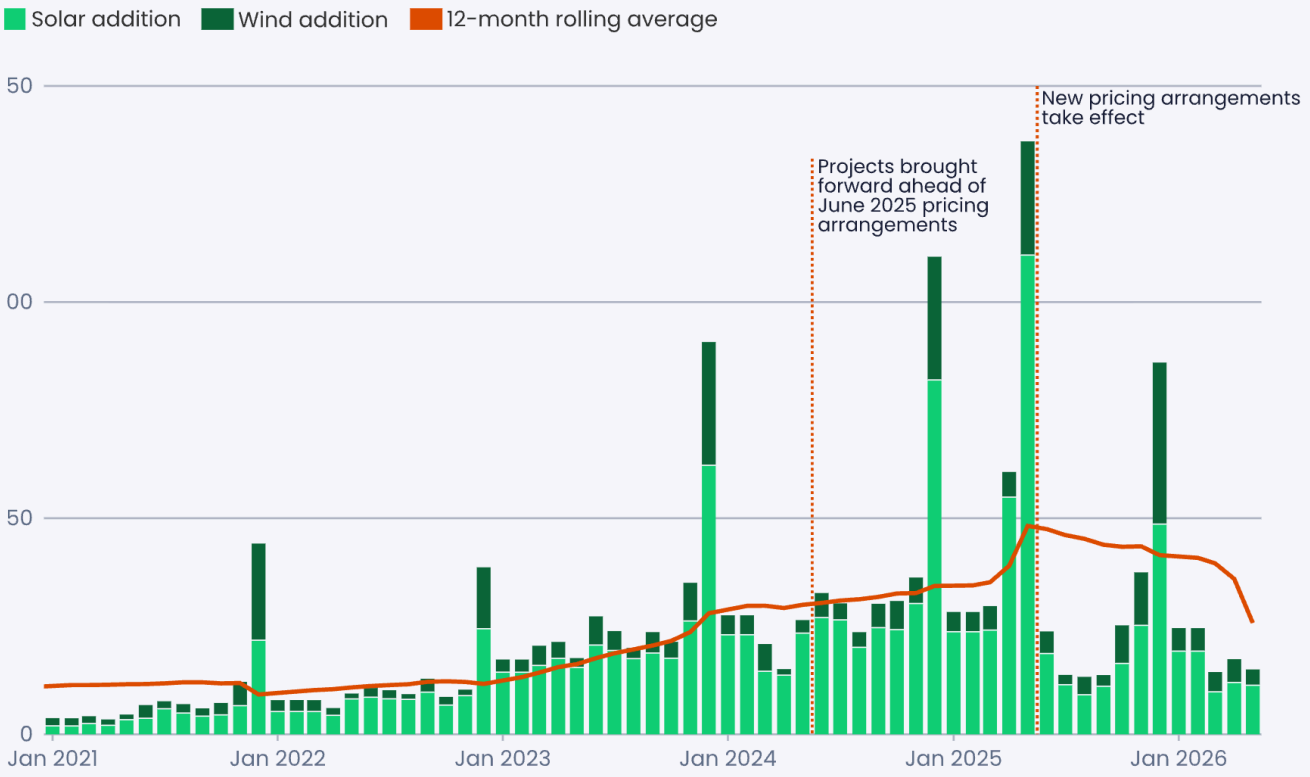
In February 2025, China released a landmark policy known as Document No. 136. It required renewable pricing to shift from guaranteed benchmark tariffs to market-based arrangements, with newly commissioned projects participating more fully in power market transactions. Projects completed before the 1 June 2025 deadline could remain under the

previous pricing arrangements, and developers had a strong incentive to accelerate commissioning. This brought projects forward and concentrated a large share of annual additions in the first half of the year.

The sharp slowdown that followed was therefore partly a consequence of this front-loading. Some projects that would otherwise have been completed later had already entered operation. It also marked the beginning of a broader adjustment, as developers began adapting to the new pricing framework and the power system worked to accommodate a large wave of new variable capacity. These factors point to a period of adjustment rather than a reversal of the earlier expansion. The implications for future deployment are examined in Chapter 2.

Solar and wind installations in China surged ahead of the June 2025 pricing reform deadline, before entering an adjustment

Monthly wind and solar power generation installed capacity addition (GW)

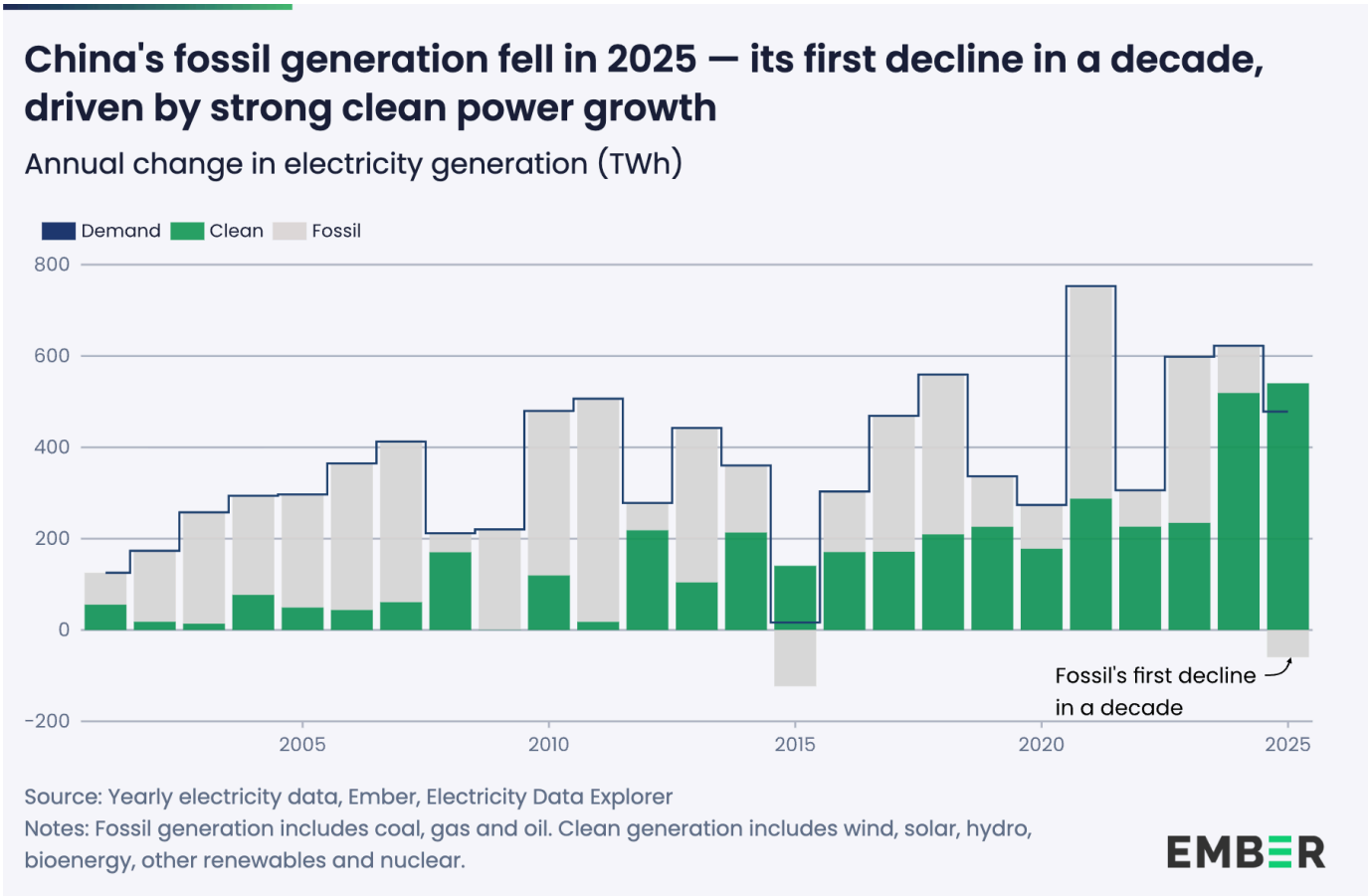


Source: Monthly Electricity Data, Ember, Electricity Data Explorer

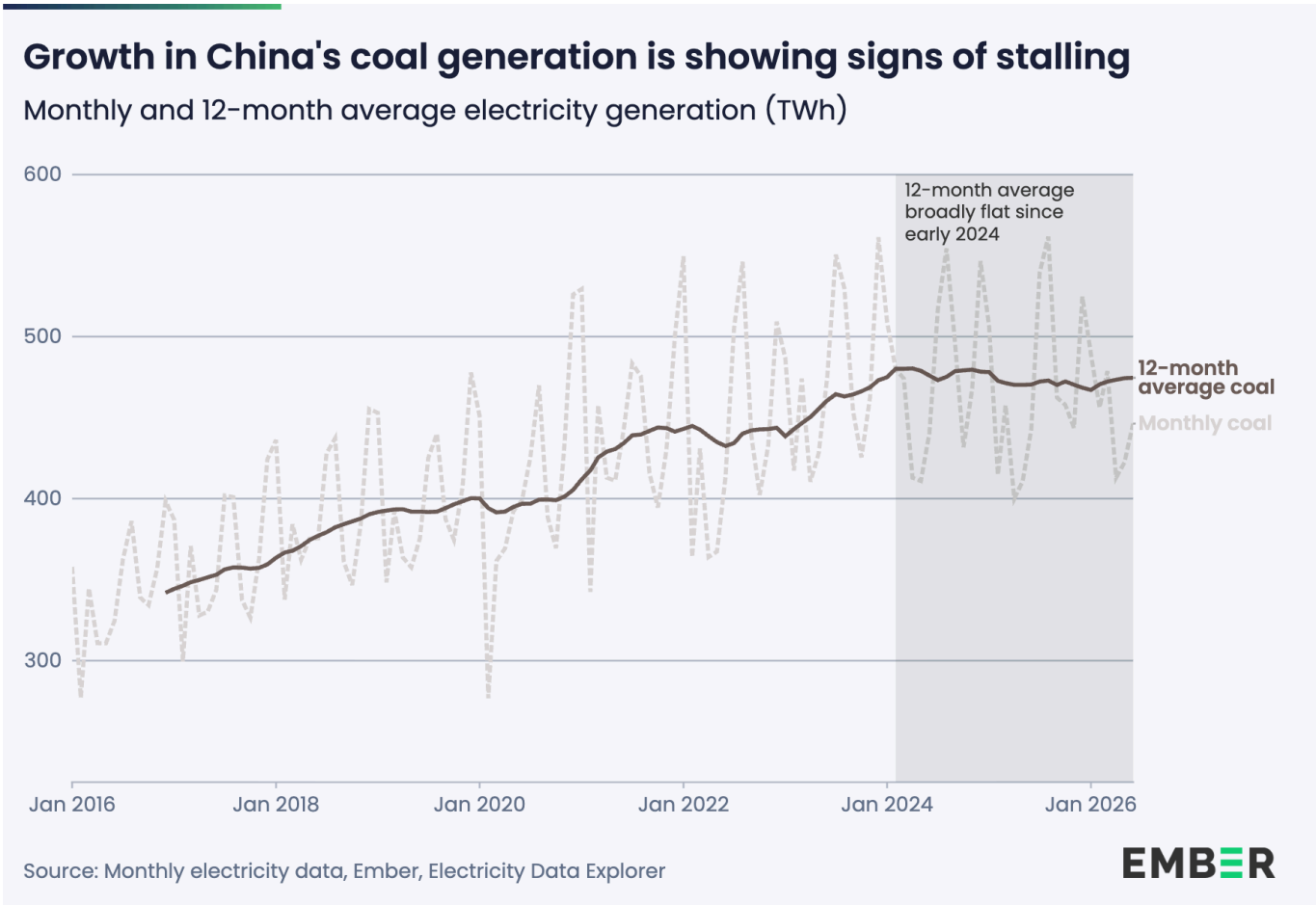
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Clean power growth pushed coal generation down for the first time in a decade. Led by strong wind and solar growth, clean electricity met all of China's additional power demand in 2025, contributing to a 0.7% decline in thermal generation, most of which is coal power. This happened even as demand rose by 5%, driven primarily by rising electrification and industrial expansion. This marks a significant departure from 2015, the last time thermal generation fell. At that time, electricity demand was almost flat, growing by only 0.5%, the slowest rate since 1974.



The 2025 decline may prove more than a one-year anomaly. A single year of falling coal generation does not, on its own, prove a structural shift. Coal generation can fluctuate with weather, hydropower conditions, industrial demand and economic cycles. But measured by the 12-month moving average, which smooths these fluctuations, coal generation shows signs of stalling after years of continued expansion. This suggests the 2025 decline is not an isolated event, but a sign that coal's long expansion is increasingly losing momentum.

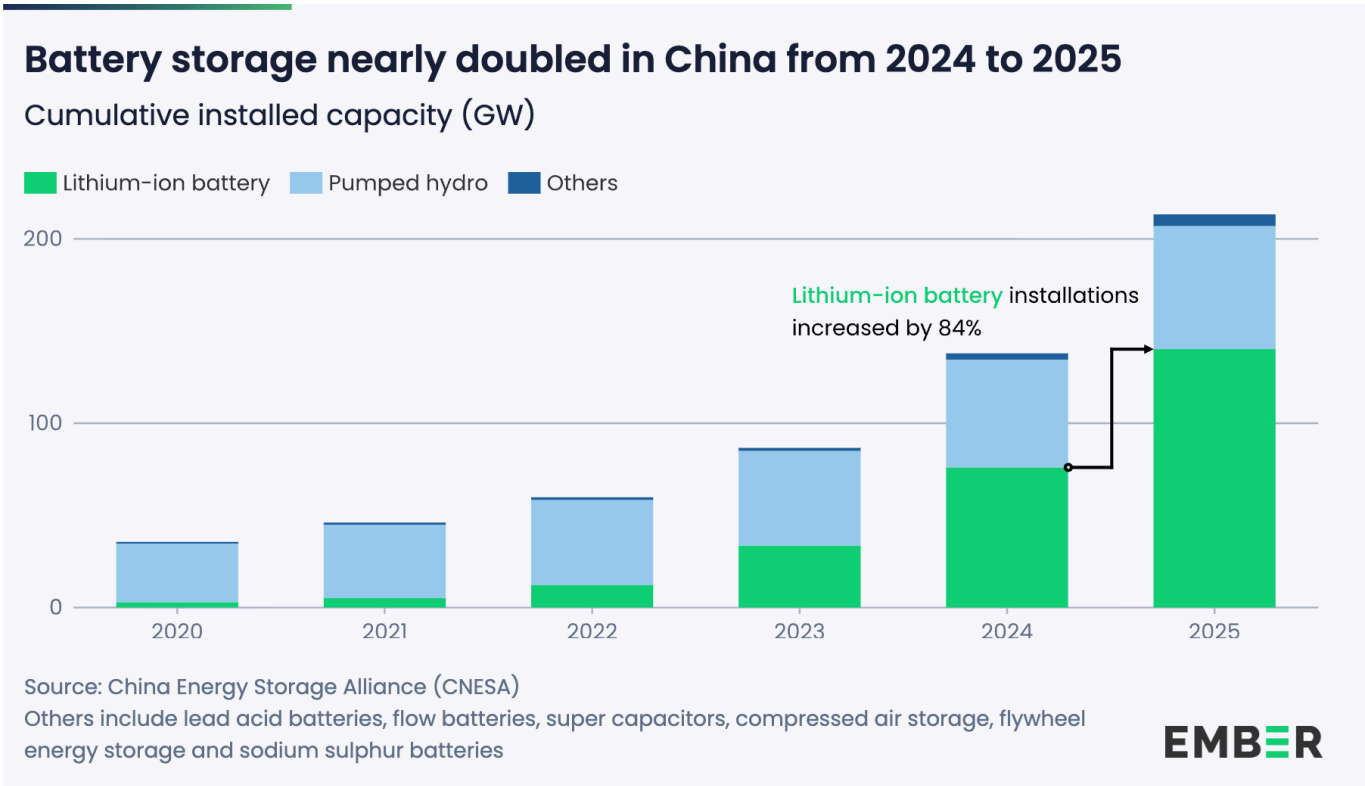


1.2 System: Clean flexibility gains scale

and solar increases the need fior filexibility to manage daily, seasonal and weather-driven variations in output. While coal-fired power plants still provide much of this flexibility, the scale of clean balancing capacity is now growing fast enough to take on a real share of the job.

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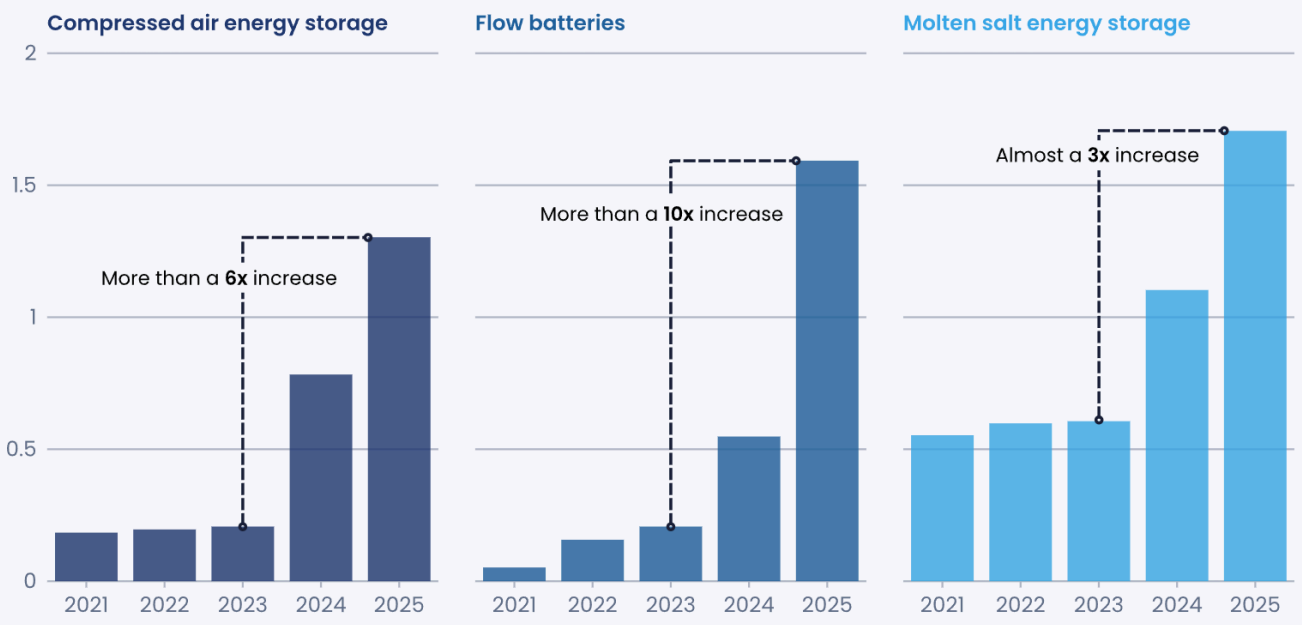
Battery storage has moved from niche to the mainstream in just a few years. Pumped hydro remains the long-established backbone of China's large-scale clean balancing architecture, but battery storage has caught up fast. It overtook pumped hydro on installed capacity by the end of 2024 then grew a further 84% in 2025, nearly doubling in a single year. China is now the world's largest battery-storage market, accounting for around 60% of global capacity additions in 2025.



Storage is also diversifying beyond lithium-ion batteries. Between 2023 and 2025, compressed-air energy storage (CAES) grew more than sixfold, flow batteries increased more than tenfold, and molten-salt thermal storage almost tripled, although from relatively low bases. These technologies are better suited to longer-duration storage, shifting energy across hours or even days to smooth out longer swings in supply and demand, while lithium-ion batteries are better at managing shorter, faster variations, often from second-to-second balancing up to a few hours. The growth starts from a low base, as the chart above shows. Nevertheless, the sharp rise since 2023 reflects a shift from demonstration towards commercial-scale deployment. China connected its first 100 MW advanced CAES project in 2022. By early 2026, it had scaled the technology to a 600 MW/2.4 GWh facility, the world's largest CASE project. A large-scale molten-salt thermal storage project with an installed capacity of 1,000 MWh also went into operation in Anhui in 2025.

China's storage toolkit begins to widen

Installed capacity (GW)

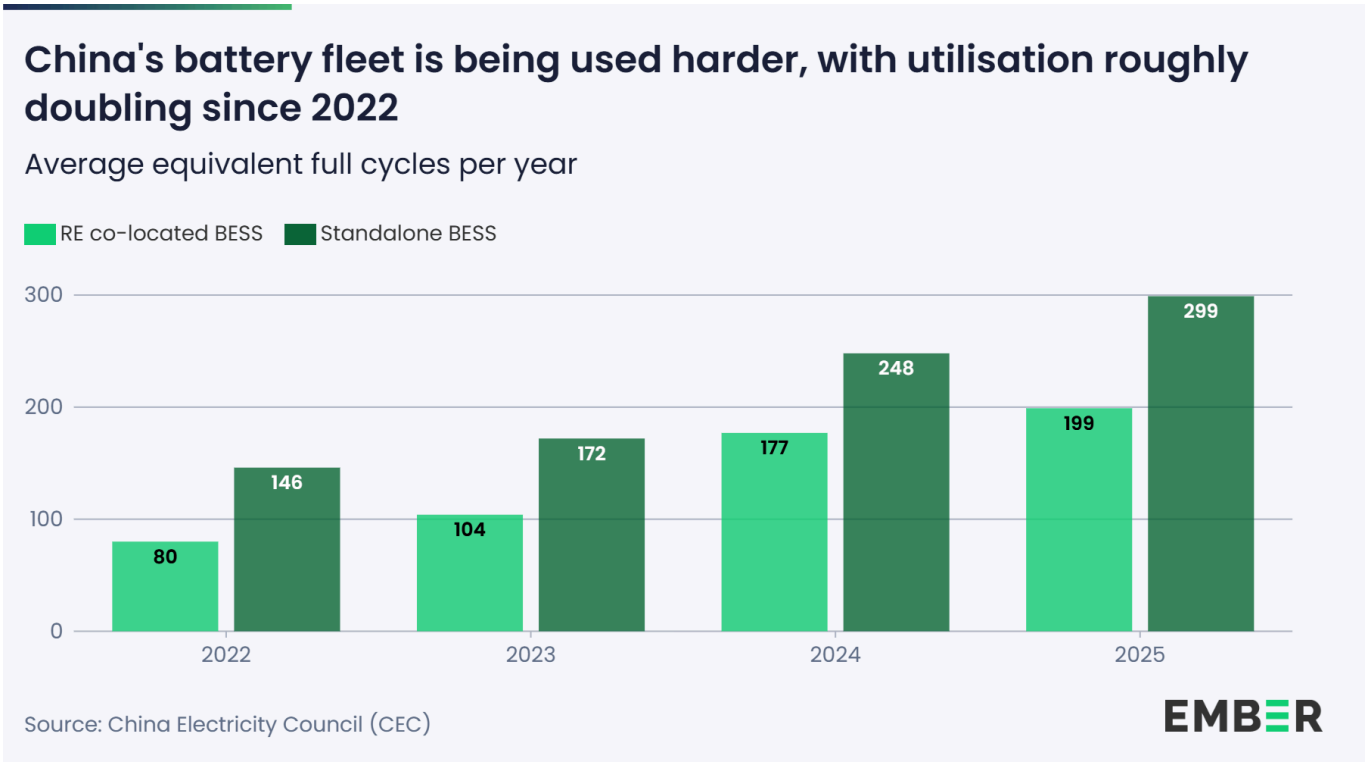


Source: China Energy Storage Alliance

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The storage fleet isn't just getting bigger — it's working harder. Capacity on its own says little. A battery fleet firms up renewable output only if it cycles, charging and discharging to move clean power from surplus to scarcity. On that measure, China's storage is beginning to earn its place in the system. Average utilisation, measured in equivalent full cycles a year, roughly doubled between 2022 and 2025, across the fleet: standalone batteries rose from 146 to 299 equivalent full cycles a year, and renewable co-located batteries from 80 to 199. An equivalent full cycle is one complete charge and discharge of a battery's full capacity, so the figure indicates how hard the fleet is being used over the year.

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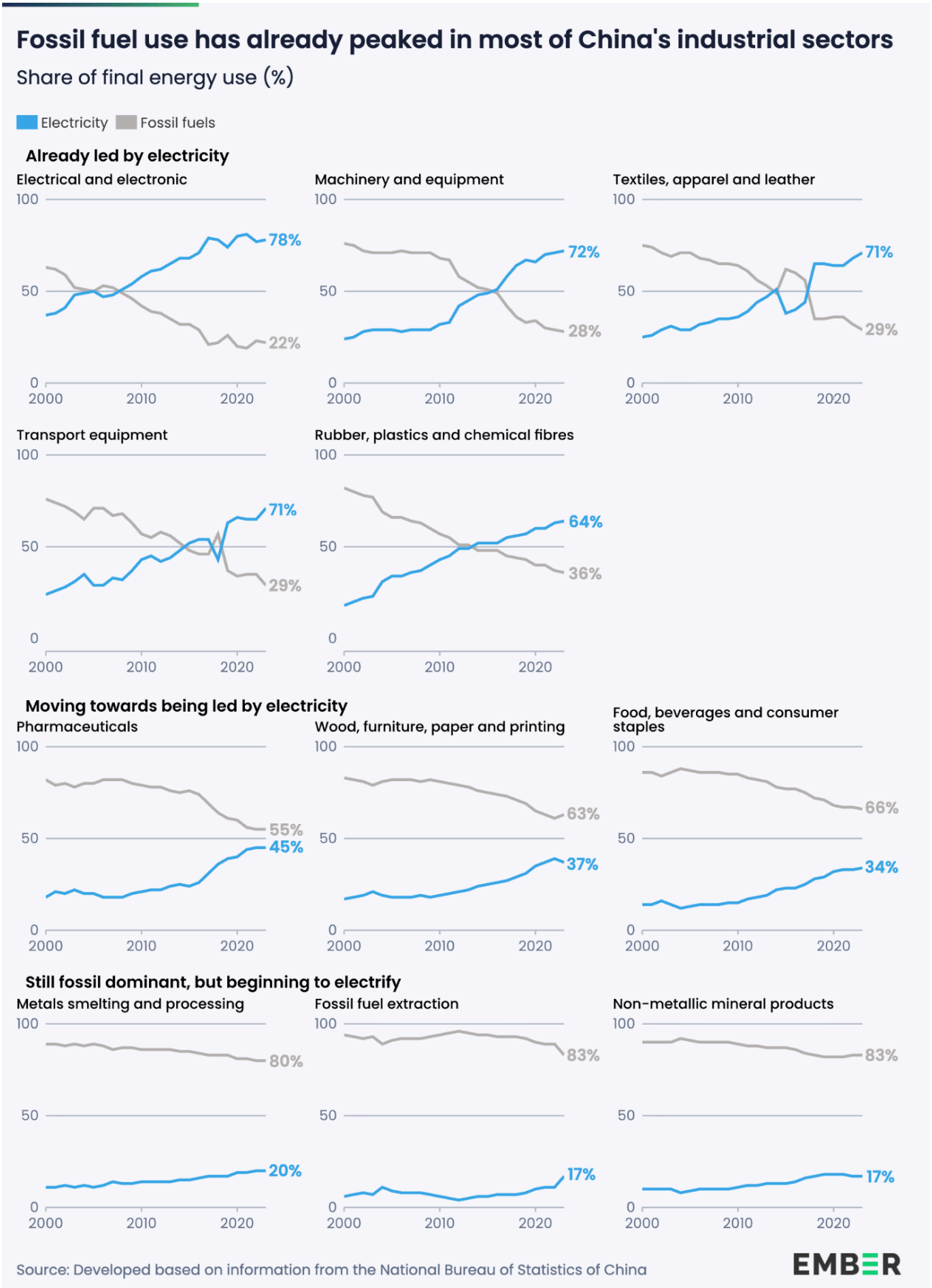


1.3 Economy: Electrification reaches more demanding uses

In 2025, China consumed about 10.4 trillion kWh of electricity, the first country in history to pass the 10-trillion mark, and more than double the total electricity consumed in the United States. But scale alone is not the story; a country of China's size would be expected to lead on absolute consumption. What matters more is that the share of electricity in final energy use has risen steadily in China, reaching 28.8% in 2024, up from 22.3% in 2015 — a level now ahead of many major economies such as Europe (around 23%) and the United States (about 21%). Combined with the rapid expansion of renewable generation, this means clean electricity is reaching ever deeper into the real economy, including parts of it long considered difficult, if not impossible, to electrify.

Across much of the light, equipment-intensive manufacturing, electricity has already become the dominant energy source. These sectors account for around a tenth of manufacturing' energy use, which is itself roughly half of China's final energy consumption. By 2023, electricity supplied about three-quarters of final energy in electrical equipment and electronics, machinery, textiles and transport equipment, and more than 60% in rubber, plastic and chemical fibres.

It is also approaching parity with fossil fuels in pharmaceuticals, food and beverages, and wood and furniture.



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These manufacturing sectors rely heavily on motors, machinery, processing equipment, drying, and low- to medium-temperature heat, making many of their energy needs technically easier to electrify. Some of this shift would have happened anyway as industrial production became more automated and equipment-intensive. But the acceleration since 2015 suggests China's wider energy transition is reinforcing the move towards electrified industrial production.

China's electrifying momentum accelerated post-2015

Electricity shares in final energy use by sector, with annualised percentage points (pp/yr) growth rates before and after 2015

		2005 share	2015 share	2023 share	Pre-2015 growth rate (2005-2015)	Post-2015 growth rate (2015-2023)	Acceleration (post-2015 minus pre-2015)
Already electricity led	Textiles, apparel and leather	29	38	71	0.90	4.13	3.23 ▲
	Machinery and equipment	29	49	72	2.00	2.88	0.88 ▲
	Transport equipment	29	52	71	2.30	2.38	+0.08 ▲
	Rubber, plastics and chemical fibers	34	52	64	1.80	1.50	-0.30 ▼
	Electrical and electronic	50	68	78	1.80	1.25	-0.55 ▼
Moving towards electricity-led	Pharmaceuticals	20	24	45	0.40	2.63	+2.23 ▲
	Wood, furniture, paper and printing	18	25	37	0.70	1.50	+0.80 ▲
	Food, beverages and consumer staples	13	23	34	1.00	1.38	+0.38 ▲

Source: Estimated by the authors based on information from NBS.
Note: This table tracks growth using percentage points per year (pp/yr) that measures the absolute shift in the total market share.

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Harder-to-electrify sectors are starting to shift. Extractive industries, petrochemicals, metals smelting and processing, and non-metallic mineral products are highly energy-intensive, together accounting for roughly 40% of China's total final energy consumption. Their electrification is often constrained by high-temperature heat requirements, the role of fossil fuels as feedstock in some processes, and long-lived and highly integrated equipment that is costly to replace mid-life. Even so, electricity's share has begun to rise across these sectors. In metals smelting and processing it rose from just over 10% of final energy use in 2000 to 20% in 2023; in fossil-fuel extraction, from under 10% to 17%; and in non-metallic mineral products, from around 10% to 17% over the same period.

In transport, electrification is spreading past passenger cars. The share of passenger electric vehicles (EVs) (including battery electric vehicles and plug-in hybrids) in new sales began rising from around 2017 and accelerated sharply after 2020, from less than 10% to over 50% by 2025, supported by favourable policies, expanding charging infrastructure and increasingly competitive domestic models. Uptake has remained strong into 2026, with passenger EVs accounting for 67.2% of new sales in June.

Trucks are more difficult to electrify because of tighter requirements around payload, range, charging time, route reliability and operating cost. Even so, the shift has begun. Starting from a low base, China's electric truck sales more than doubled in 2024, then more than doubled again in 2025, driven primarily by falling battery costs, supportive policies and the cost advantage of electricity over diesel.

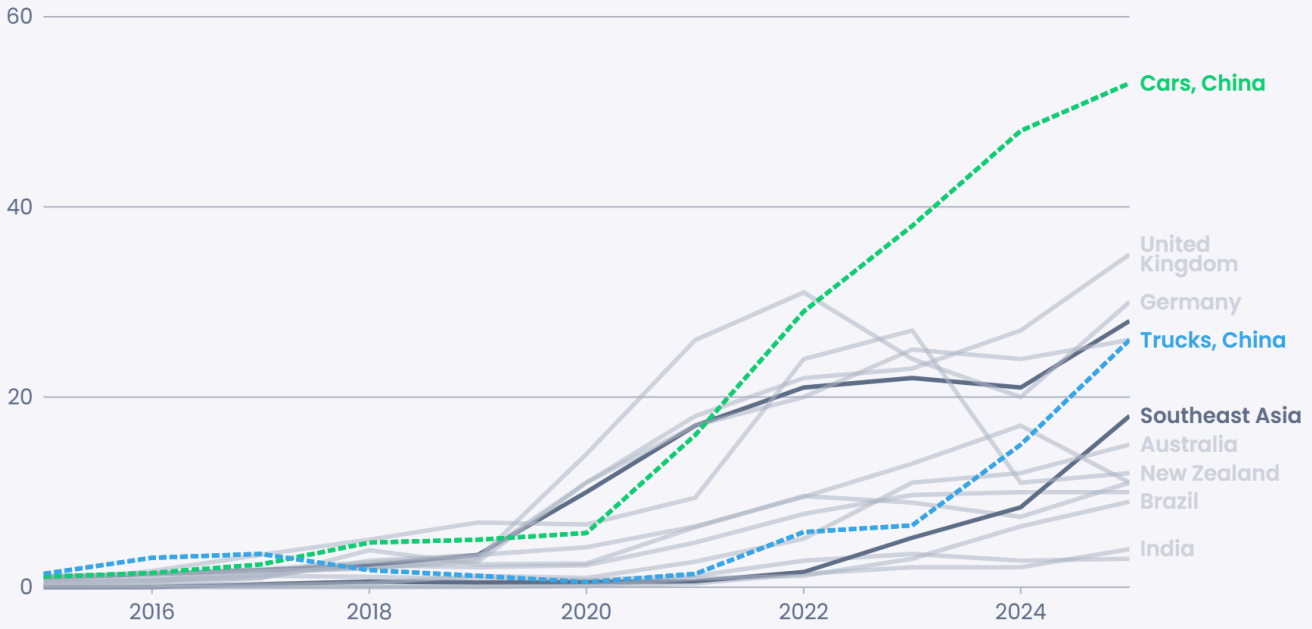
By 2025, electric trucks in China had reached a sales share comparable to electric passenger cars in several European markets, and China accounted for nine out of every ten electric trucks sold globally. The rise has continued into 2026. In June, electric trucks reached almost 45% of new truck sales, higher than passenger EVs have achieved in most countries.

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China's electric truck uptake now matches leading European passenger-EV markets

Share of electric vehicles in new sales (%)

Dashed lines show sales shares for electric passenger cars and trucks in China; grey lines show electric passenger-car sales shares in other markets.



Source: IEA's Global EV Data Explorer

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1.4 Emerging signs of fossil-fuel peaking

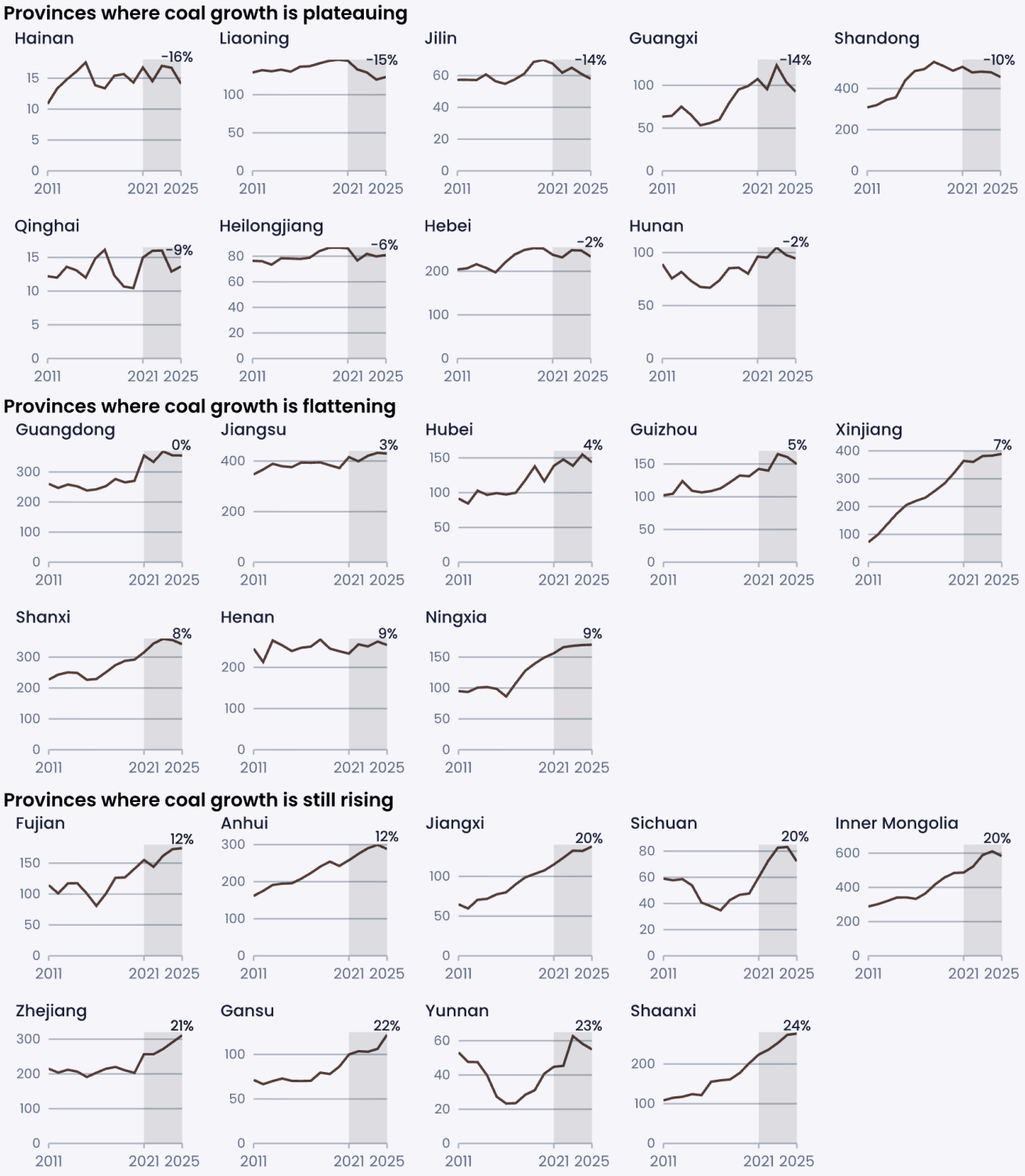
Deeper integration of clean electricity across power generation, system flexibility and the wider economy is putting more direct pressure on China's legacy fossil-fuel system. At the national level, this shift can still look uneven or ambiguous. Headline indicators, such as continued fossil capacity growth or short-term emissions increases, can dominate the macro picture. But in a country as large and complex as China, major structural shifts often begin below the national aggregate, emerging across provinces and sectors.

In the power sector, coal generation has begun to stall. This report tracks 26 provincial-level regions with significant coal generation; in 17 of them, coal generation has plateaued or turned flat between 2021 and 2025, including established industrial centres such as Shandong and Hunan. Together, these regions account for more than half of the country's total thermal capacity, most of which is coal-based.

Many provinces in China are moving out of coal growth

Coal generation across major provinces (GWh), 2011-2025

Percentage change between 2021-2025 (%) labelled



Source: Ember China province generation data

Note: Coal generation is estimated based on thermal generation and capacity by fuel; see source methodology for details

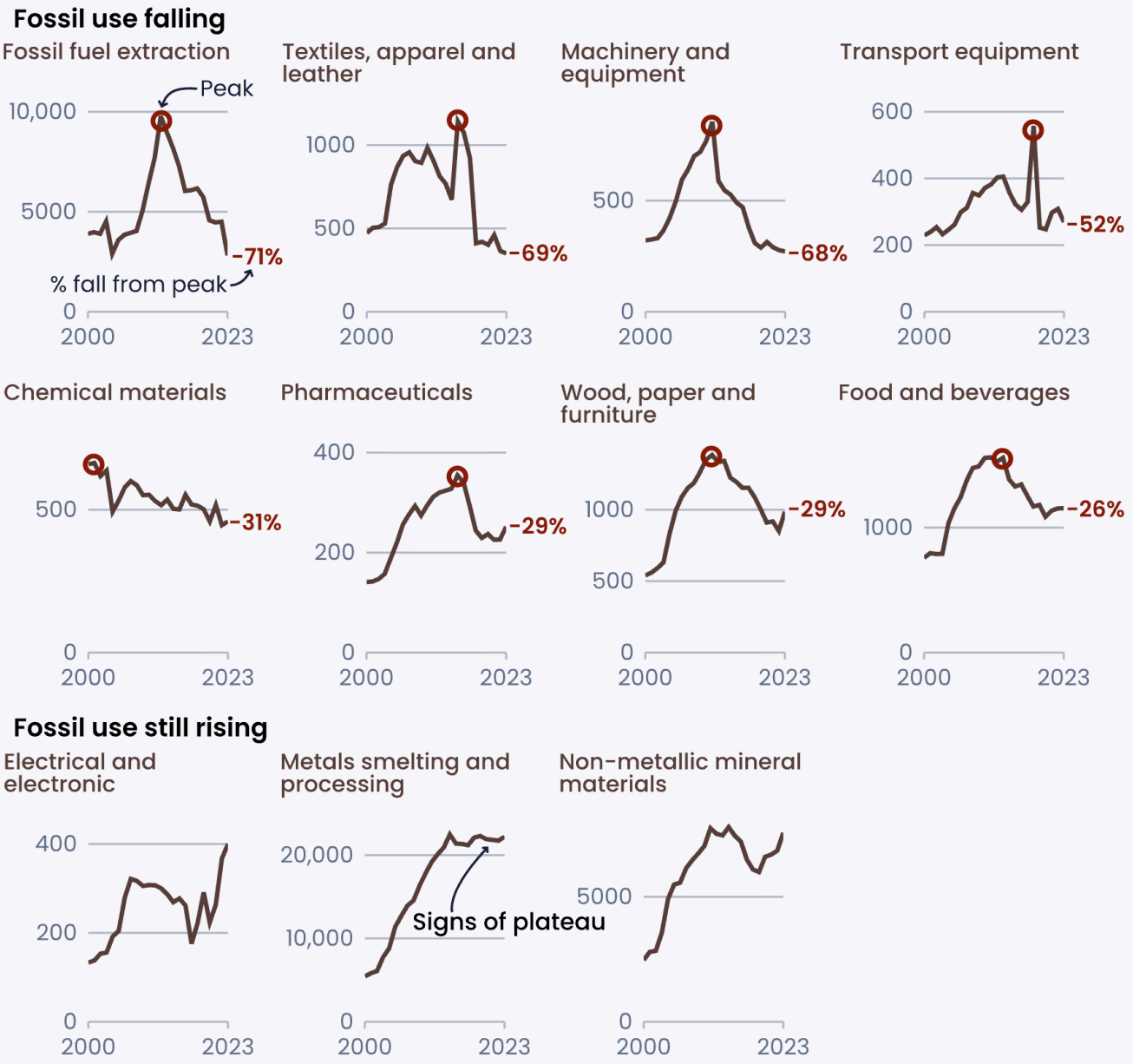
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In the wider economy, absolute fossil-fuel use has already fallen by between 26% to 71% from its peak, across eight industrial sectors, from fossil-fuel extraction to manufacturing industries such as textile, machinery, and food and beverages. Even in metals smelting and processing — among the most fossil-intensive parts of the economy — there are early signs that fossil-fuel use is beginning to flatten.

Fossil fuel use has peaked in most of China's easier-to-electrify sectors — and is showing early signs of flattening in harder ones

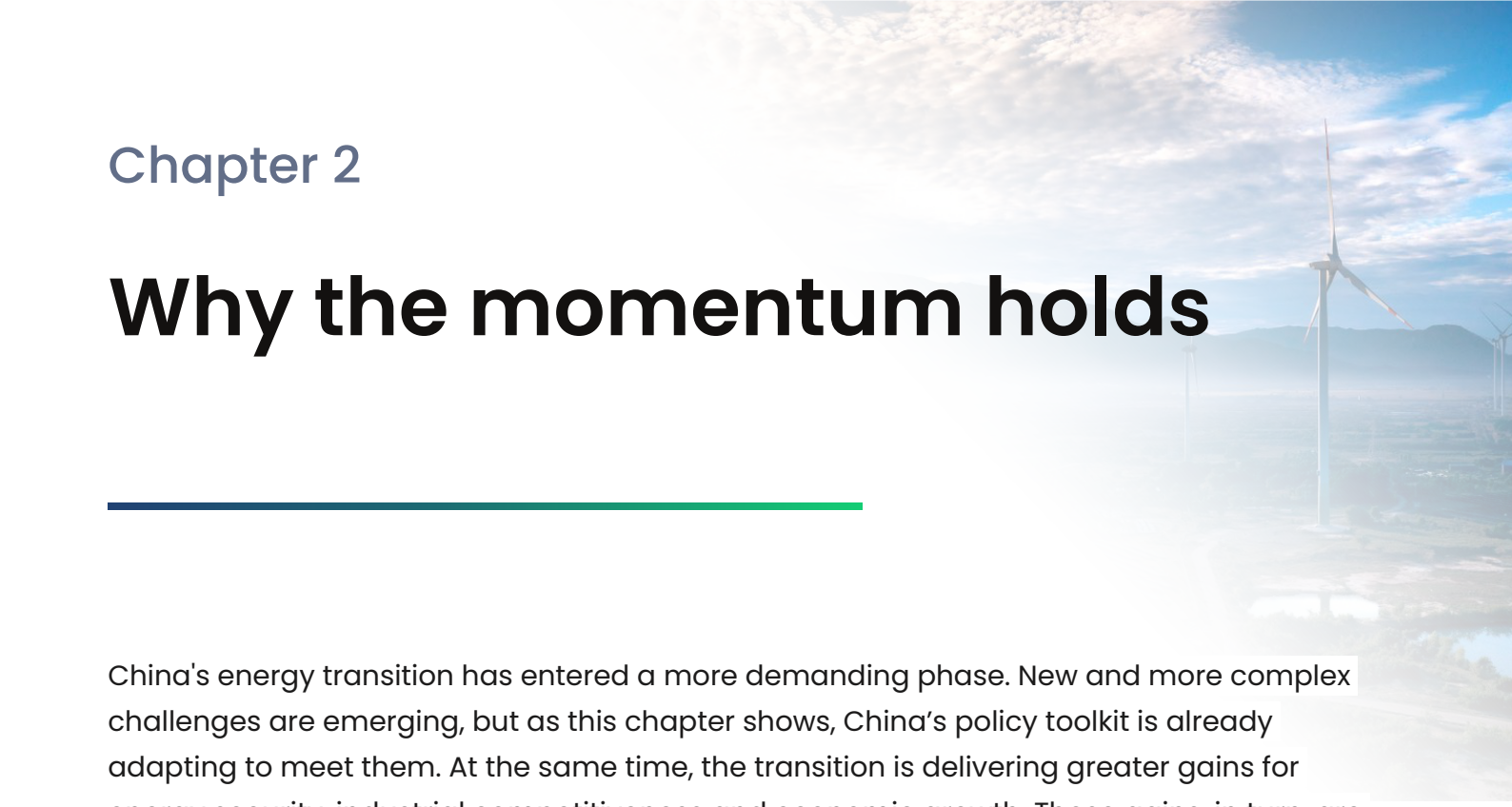
Total final fossil fuel use by industrial sector (PJ), 2000 to 2023



Source: Developed based on information from the National Bureau of Statistics of China

As fossil-fuel use begins to flatten or decline across parts of the power system and wider economy, China's transition is approaching the more demanding phase of "building while breaking". This marks significant progress, but it is also generating new and more complex challenges, raising a central question: can this momentum be sustained and extended — both into provinces and sectors where fossil-fuel use is still rising, and deeper into activities where clean electricity has already begun to constrain fossil-fuel growth?

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Chapter 2

Why the momentum holds

China's energy transition has entered a more demanding phase. New and more complex challenges are emerging, but as this chapter shows, China's policy toolkit is already adapting to meet them. At the same time, the transition is delivering greater gains for energy security, industrial competitiveness and economic growth. Those gains, in turn, are broadening support and strengthening confidence, creating the conditions for it to go further.

2.1 What the next phase requires

As China approaches the phase of "building while breaking", sustaining momentum will require progress on three interconnected fronts: expanding clean electricity rapidly to keep pace with demand, integrating it more deeply and sustainably into the power system and wider economy, and managing the growing pressure on the legacy fossil-fuel system.

Sustaining expansion

China's electricity demand has almost doubled over the past decade, passing 10,000 TWh in 2025. Growth should stay strong, primarily driven by rising electrification, an expanding digital economy and advanced manufacturing. While slower than in earlier years, the IEA predicts an average annual growth rate of 4.9% through 2030, adding around 2,600 TWh of demand over the period — roughly equivalent to the total electricity consumption of the European Union today. If China is to peak coal and oil consumption as stipulated in the latest Five-Year Energy Plan (2026-2030), clean electricity must expand fast enough to meet all additional demand.

This is now harder than it was. The immediate task is to manage the sector's adjustment to more market-oriented pricing. Document No. 136 phases out quasi feed-in tariffs (FiTs) for renewable projects, project revenues depend more directly on market prices, curtailment risks, and when and where electricity is generated. Developers need time to reassess project economics and adapt their business models, while policymakers refine market rules that can provide sufficient certainty to support continued investment.

The power system, meanwhile, must absorb the large volume of variable renewable capacity commissioned ahead of Document No.136's 1 June 2025 cut-off while creating room for further expansion. Grid connections, system flexibility and demand-side response all have to keep pace with renewable deployment. Doing so will be critical to limiting curtailment and reducing revenue uncertainty, both of which could weaken project economics, undermine investor confidence and slow the next wave of investment.

Extending integration

Expanding clean electricity is only half of the job. Integrating it more deeply into the power system and wider economy, taking on functions still performed by fossil fuels is also important. Both tasks become more demanding as China's transition moves beyond its easier stages.

In the power system, clean balancing capacity, including battery storage, pumped hydro, demand-side response and more flexible grid operation, must keep scaling to take over more of the functions coal still performs.

Across industry, many sectors, especially in manufacturing, are already highly electrified. What remains is residual fossil-fuel use, which is often concentrated in the hardest corners: specialised heat applications, long-lived legacy assets, or sites facing grid constraints. Fossil-intensive heavy industries such as iron and steel, cement and chemicals are harder: their transition requires not only clean electricity but also changes to production processes, engineering practices, technical standards and business models — and, in some cases, new technologies that are not yet commercially mature.

In transport, the easy wins in passenger vehicles now give way to trucks, shipping and aviation, where payload, range and cost make electrification far harder. In some

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applications, the transition may even rely on electricity-derived fuels such as hydrogen, ammonia and synthetic fuels, whose technologies and supply chains are still developing.

Managing the legacy system

As coal generation stalls in more provinces, coal-fired power plants will increasingly face lower operating hours, changing revenue models and a shift from supplying bulk electricity towards providing capacity and flexibility. The effects will flow through the wider coal-electricity supply chain, affecting mines, railways, ports, equipment suppliers and service industries. This is not only a technical challenge for the power system, but also a political-economy challenge for provinces and local economies where coal-related industries still support fiscal revenues, employment and industrial activity.

Many coal-dependent regions have already been experimenting with responses, including flexibility retrofits, asset repurposing and broader economic diversification. The task is to accelerate and scale these efforts as lower coal utilisation becomes more widespread and the pressure on coal-dependent regions intensifies.

2.2 Adapting the policy toolkit

The emergence of new and more complex challenges is a natural feature of any major economic or industrial transformation, particularly as change reaches its harder stages. The scale of these challenges does not, by itself, signal that momentum is weakening. What matters more is whether policy is adapting in ways that allow the transition to move through this harder phase. That evolution is already taking shape, as the selected developments below illustrate.

China is adapting its policy toolkit for the next phase

Challenge	Response area	What it does	Specific measures
Sustaining expansion	From scale-first expansion to value-focused deployment	Shifts renewable support from rewarding capacity and volume towards market signals for when and where power is valuable, while cushioning the adjustment	**Revenue stabilisation:** new projects participate in market-based pricing, while a CfD-type mechanisms limit excessive revenue volatility. **Grid expansion and upgrades**: building transmission corridors for large wind and solar bases, strengthening cross-provincial and cross-regional transmission, and upgrading distribution grids. **Storage and flexible resources**: supporting pumped hydro, new-type storage, microgrids, virtual power plants, vehicle-grid interaction and demand-side response
Deepening integration	From efficiency gains to structural integration	Shifts the top-level focus from energy use to carbon emissions, and create stronger demand and support for clean electricity in end-use sectors	**High-level framework**: from dual control of energy to dual control of carbon emissions. **Demand push**: renewable-consumption responsibilities for provinces and energy-intensive industries, with green certificate accounting, monitoring and assessment **Other support**: pilot low-carbon industrial parks; breakthrough technologies (e.g. green hydrogen); sectoral roadmaps and action plans
Managing the legacy system	Preparing coal-dependent regions for a broader, more systemic transition	Extends support from a reactive, place-specific approach towards an anticipatory agenda for a wider set of coal-reliant regions	**Broadened scope**: support beyond resource-depleted cities and overcapacity cases to regions reliant on coal for revenue, jobs and services. **Policy signals**: 2024 green-transformation opinion and 2026 energy-saving and carbon-reduction opinion **Financing**: a proposed national low-carbon transition fund

Source: Developed by the authors based on the discussion presented in Section 2.2

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From scale-first expansion to value-focused deployment

China's success in scaling renewable energy provides the backdrop for this shift. Earlier policy support, including quasi-fixed tariffs, was critical in creating demand, lowering investor risk and accelerating capacity growth. But once renewable energy reaches scale, support mechanisms also need to evolve. Continuing to reward capacity growth and generation volume without sufficient regard for system value can worsen curtailment and place pressure on project returns.

China now appears to be shifting renewable support from a predominantly scale-first model towards more market-oriented and value-focused deployment. Document No. 136, introduced in February 2025, is the clearest step: newly commissioned projects have to trade far more fully in power markets rather than sell at guaranteed benchmark tariffs. Under this approach, future projects are exposed to clearer market signals about when and where electricity is valuable, taking into account local demand, grid conditions, curtailment risks and storage availability. Over time, this should make new projects more commercially sustainable, though short-term adjustments are likely, as rules take time to settle and investors need time to reassess project economics and adapt their business models.

To ease this adjustment and support continued investment, several initiatives have been introduced to stabilise revenues and strengthen the system's ability to absorb rising renewable output. These include a CfD-type mechanism to stabilise revenues, and sustained support for grid augmentation and energy storage.

From efficiency gains to deeper structural integration

Pushing clean electricity deeper into the real economy requires changing the energy industry uses. China's policy framework is evolving in that direction — at the top, through a shift in how climate goals are governed, and beneath it, through more targeted measures that carry the shift into the sectors where fossil fuels remain entrenched.

For years, the main macro-level lever was the "dual control" of total energy consumption and energy intensity, which pushed firms to reduce the amount of energy used per unit of economic output. Electrification was part of this story, especially where more automated, equipment-intensive production improved efficiency and reduced direct fossil-fuel use.

Deeper decarbonisation, however, requires more than efficiency gains. It means reconfiguring industrial ecosystems built up over decades around fossil inputs, including heat supply, production processes, engineering practices, material flows and technical standards. China's shift towards dual control of carbon emissions – controlling both the total volume of carbon emissions and their intensity – supports this change by focusing more directly on emissions outcomes and strengthening incentives to replace fossil fuels with clean electricity instead of treating all energy use alike.

Beneath this macro shift, a demand-side renewable consumption mechanism creates enforceable demand for renewable energy. Provincial governments and selected energy-intensive industries including steel, cement, aluminium and polysilicon are assigned renewable electricity consumption responsibilities, backed by green certificate accounting, monitoring and assessment. The obligations on major users have tightened from 2026.

Additional measures include developing pilot low-carbon industrial parks, supporting breakthrough technologies (*e.g.,* green hydrogen), and translating national carbon targets into more detailed policies for hard-to-abate sectors such as steel, cement, chemicals and non-ferrous metals.

Preparing coal-dependent regions for a broader, more systemic transition

China's policy approach to coal-region transition has historically focused on resource-depleted cities and overcapacity management. This created an important foundation, but also a relatively patchy and reactive policy landscape. Support was often triggered by localised pressures only after they had already emerged, such as resource exhaustion, layoffs, public-service funding gaps and mining-related land damage.

Earlier efforts were also aimed at a different problem. The supply-side capacity cuts of 2016-17, for instance, sought to rebalance the coal market rather than to manage a systemic transition. Once demand recovered, capacity and production rose again. The challenge now is different in kind. As China enters a phase in which coal consumption is expected to peak and gradually decline, the pressure on coal-dependent regions is likely to be structural rather than cyclical.

Policy needs to evolve accordingly. This means extending support beyond places where coal resources are being depleted or inefficient capacity is being consolidated, towards a wider group of coal-dependent regions whose fiscal revenues, employment, industrial structures and public services remain closely tied to coal.

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Recent policy developments suggest a stronger emphasis on this broader regional transition agenda. The 2024 opinion on accelerating the comprehensive green transformation of economic and social development calls for stronger support for the green transition of resource-based regions. Building on this, the 2026 opinion on higher-level and higher-quality energy saving and carbon reduction emphasises policy support for the green transition of traditional industries and resource-based regions, including studying the establishment of a national low-carbon transition fund.

2.3 The growing-by-greening dynamic

The slowdown in solar capacity additions in the first half of 2026 is not simply evidence that China's transition is losing momentum. It is better explained by the adjustment to Document No. 136 than by any weakening of the transition: new rules take time to bed in and short-term variation in commissioning is the expected cost of that adjustment. The more important question is whether China's strategic commitment remains firm.

So far, it shows no sign of weakening. Released in March 2026, the 15th Five-Year Plan, the overarching framework guiding China's socio-economic development through 2030, aims to "actively and prudently advance and achieve carbon peaking". Later in June, the Five-Year Energy Plan operationalises this objective, setting out to "initially establish a clean, low-carbon, secure and efficient new energy system" by 2030 and listing, among its main targets, that coal and oil consumption should peak.

These commitments rest on a strategic weighting. Greater weight falls on returns to the wider economy over the long run instead of at the project or sector level.

There is growing recognition that the fossil-intensive model that once powered China's economic rise is becoming harder to sustain. It delivered extraordinary growth, but left the country heavily dependent on imported oil and gas, exposed to volatile global commodity markets, and saddled with mounting environmental costs. Global climate action and, more recently, fossil-fuel supply disruptions have also created demand for clean-energy technologies, providing opportunities for China to cultivate the industries of the future.

This strategic case provides the initial impetus. Its durability rests on something more concrete: having reached scale, the transition delivers greater energy security, stronger industrial competitiveness and new sources of economic growth. The sections below trace how these tangible gains are taking hold.

An expanding EV fleet as a demand-side strategic reserve. China's oil-import dependence is often seen as a core vulnerability, with imports accounting for more than 70% of its total oil consumption. Beneath this headline dependence, however, rapid transport electrification is already displacing oil demand at scale. Multiple estimates suggest that EVs are displacing gasoline at around 0.4–0.5 million barrels per day (mb/d). Broader estimates put China's avoided oil demand at around or above 1 mb/d, translating into an annualised displacement of roughly 365–400 million barrels. To put this in perspective, this avoided demand over a single year is roughly twice OECD Europe's government-held strategic oil inventories, which stood at 179 million barrels at the end of 2025.

Transport electrification is creating a demand-side buffer in China

Selected estimates of oil demand displaced by EV adoption

	Estimate (mb/d)	Source
Gasoline displaced by EVs	0.43 in 2024	CEPR
	0.40 in 2025	OIE
	0.43 in 2025; 0.54 in 2026	Kpler
Total oil demand reduced by EVs	Around 1.0 in 2025	IEA
	1.11 in 2025; 1.71 in 2026	Rhodium Group

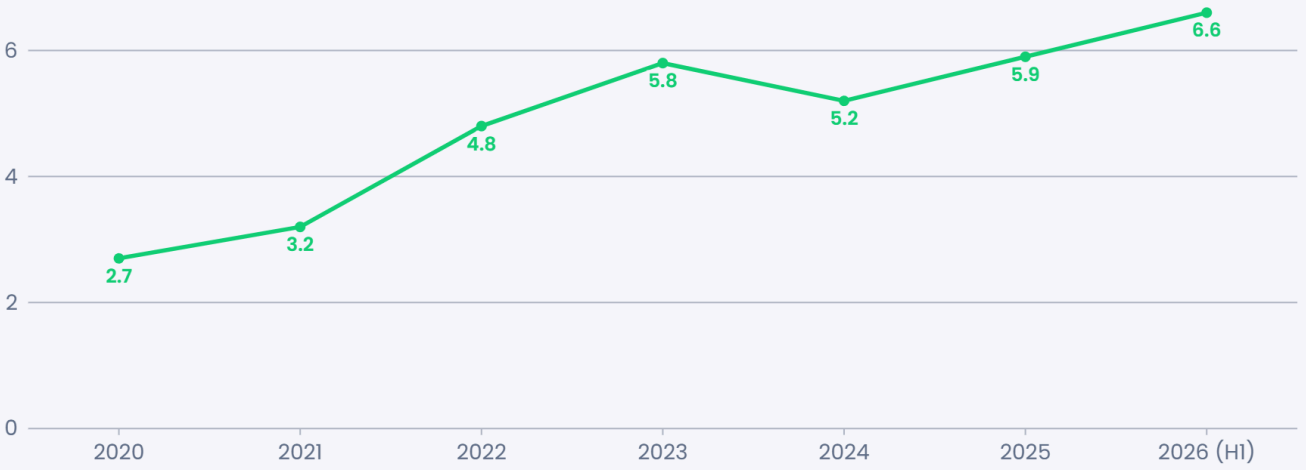
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Clean technology accounts for 6.6% of China's exports, up from 2.7% in 2020. Exports have driven the Chinese economy for decades, and clean-technology sectors now form a substantial part of them. China's clean-technology exports, including batteries, EVs, solar PV, wind equipment and grid infrastructure, exceeded USD 140 billion in the first half of 2026 alone, more than double the total recorded for the whole of 2020. This accounted for 6.6% of total exports in the first half of 2026, up from just 2.7% in 2020.

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Cleantech is rapidly becoming a new export engine in China

Share of total exports (%)



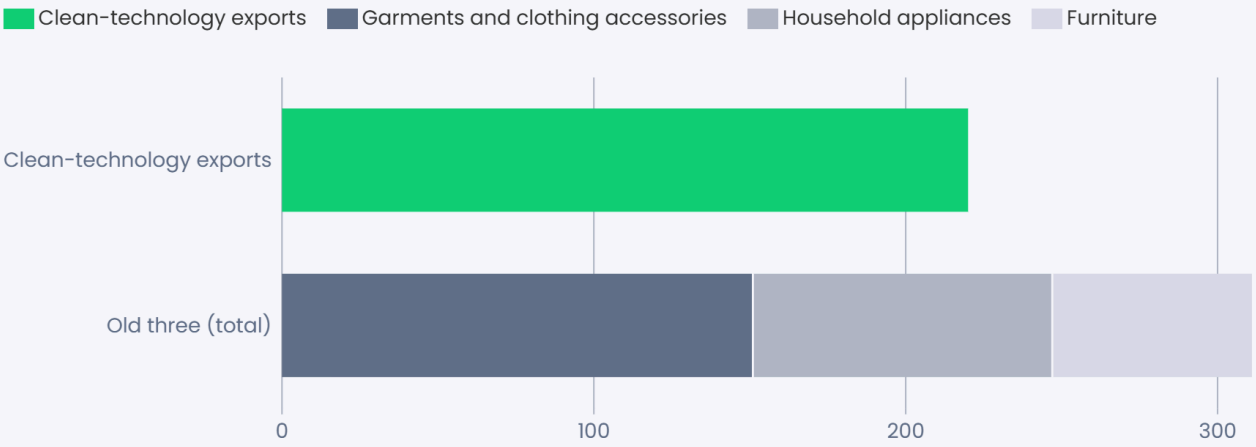
Source: National Bureau of Statistics, Ember's China Cleantech Exports Data Explorer

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In 2025, China's clean-technology exports surpassed USD 220 billion, bringing them closer in scale to the country's traditional export "old three": garments, furniture and household appliances.

China's clean-tech exports are approaching the scale of the "old three"

Export value in 2025 (US$ billion)



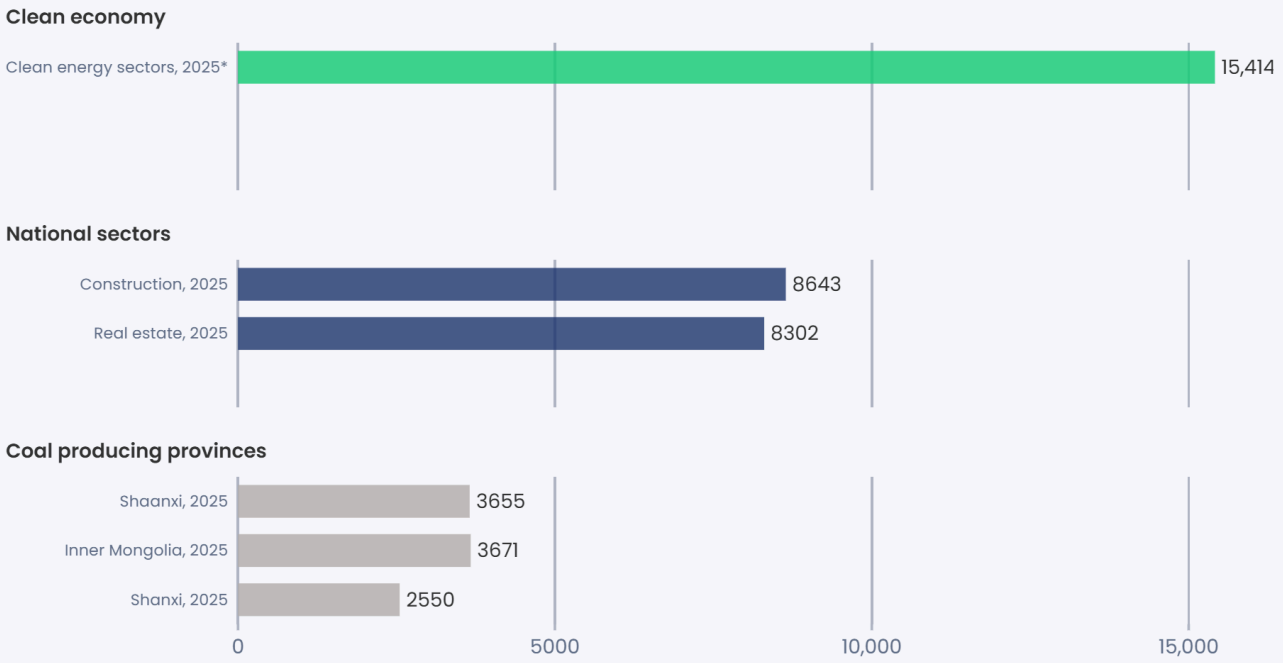
Source: China Cleantech Exports Data Explorer, General Administration of Customs of China database
Note: Clean-technology export values are drawn from Ember's China Cleantech Exports Data Explorer and include batteries, electric vehicles, grid equipment, heating and cooling systems, solar PV and wind equipment. Export values for garments and clothing accessories, household appliances, and furniture and parts are taken from the .

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Clean energy generates economic value on a scale comparable to real estate and construction. China's clean-energy sectors are estimated to have generated around CNY 15.4 trillion (USD 2.1 trillion) in economic value in 2025, exceeding the combined value added of the three largest coal-producing provinces (Shanxi, Shaanxi and Inner Mongolia). This comparison requires qualification. The clean-energy figure is a reconstructed estimate of economic activity linked to investment, manufacturing and related supply chains, rather than an official national accounts sector. Even so, it conveys the scale the clean economy has reached. Sectors once seen as marginal or policy-supported now stand comparable to some of China's old growth engines.

China's clean economy has reached the scale of established growth pillars

Value-added by year (RMB Billion)



Source: Carbon Brief, National Bureau of Statistics
* Estimated economic value: RMB 15,414 billion refers to CREA / Carbon Brief's estimated GDP contribution of China's clean-energy sectors in 2025. It includes both investment in clean-energy sectors and the production of clean-energy goods and services. It is not an official national account sector. Other sectors shown in the chart are official sectoral and provincial value-added.

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Reduced reliance on fossil-fuel imports, new export strengths and investment flowing through industrial supply chains are signs that the clean economy is becoming a key source of economic growth. As this takes hold, continued economic expansion becomes increasingly tied to deepening the transition and to the growth opportunities that unlock in emerging sectors.

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These developments suggest a feedback mechanism: growth in new sectors spurs further investment and creates jobs, those gains broaden support and deepen the material interest in pushing the transition further, and each round of progress strengthens both the capability and the incentive to pursue the next. If this pattern holds, it would help explain why China's transition has so far shown no sign of weakening, even as the harder phase ahead brings new costs and complications.

Chapter 3

What China's transition means

The preceding chapters show that China is progressively rebasing a large and complex industrial economy on a cleaner, electric foundation, with clean electricity starting to take over functions once performed by fossil fuels across generation, system balancing and the wider economy. The legacy fossil-fuel system is registering the shift: coal generation is stalling across a growing number of provinces, fossil-fuel use is flattening across a widening set of industrial sectors, and the first changes are visible even in heavy industry.

As China's transition approaches the more demanding phase of "building while breaking," sustaining it will take continued expansion of clean electricity, deeper integration across the real economy and careful management of the economic fallout for coal-dependent regions. New market rules, regulatory incentives and institutional arrangements will need to be tested and refined as they go, and short-term fluctuations in renewable capacity additions and investment are likely to remain part of the picture.

The high-level policy commitment to peaking carbon emissions, along with oil and coal consumption, before 2030 is firmly in place, and as Chapter 2 showed, economic self-interest now reinforces it. Cutting dependence on fossil-fuel imports, building new export industries and drawing investment into clean-energy supply chains have begun to reshape where China's growth comes from. The further this advances, the more that growth becomes tied to deepening the transition, including into the new industries it can unlock.

The significance of this shift does not stop at China's borders. It is reshaping the context within which others weigh their energy choices: what energy security can look like in an era of geopolitical shocks (Section 3.1), how much economic growth and deeper industrialisation still depend on fossil fuels (Section 3.2), and where global fossil-fuel demand is now heading (Section 3.3).

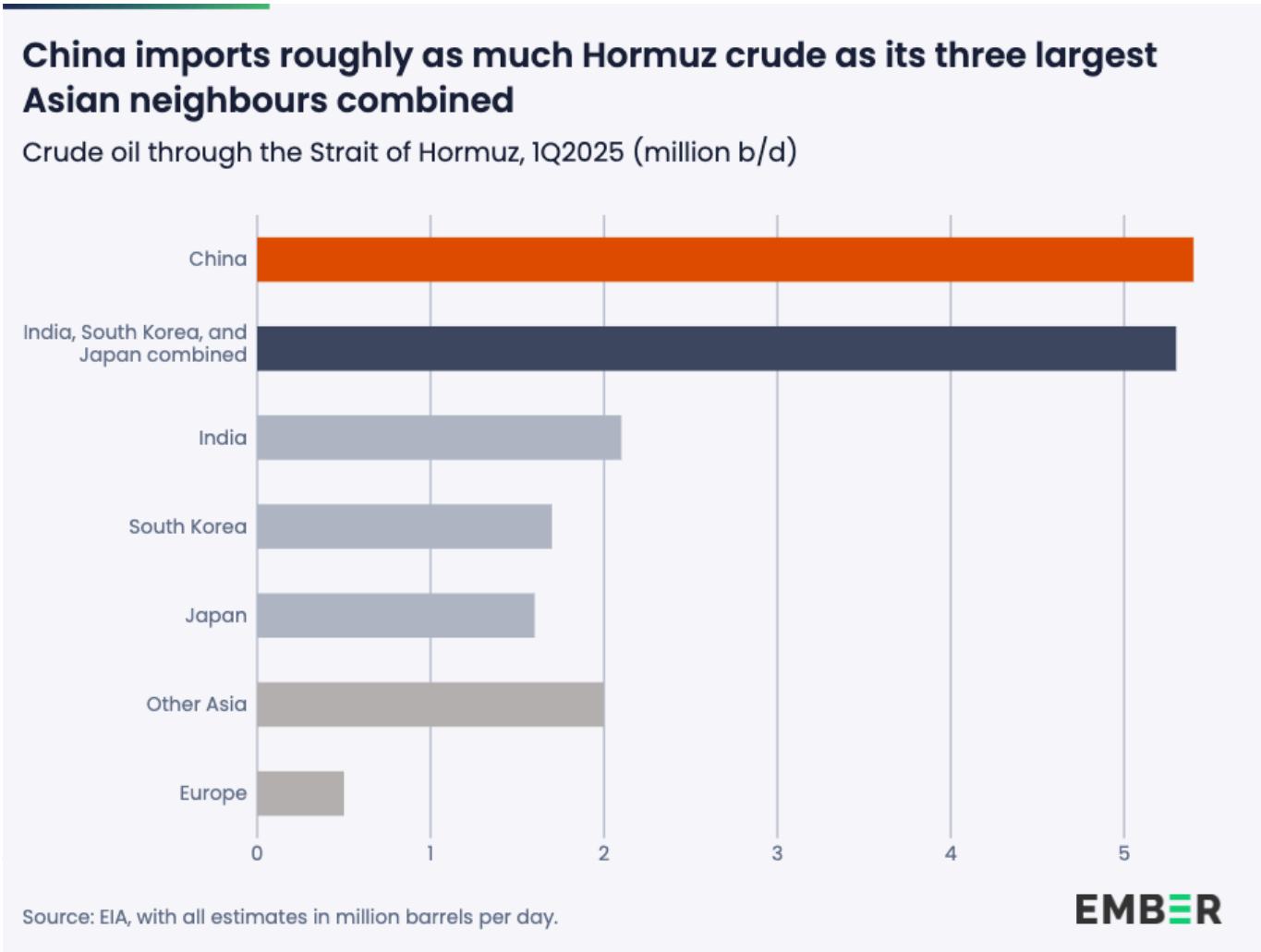
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3.1 Energy security through reduced import exposure

For decades, thinking around energy security centred around managing market risk — price spikes, supply gluts, demand swings — even as geopolitical shocks occasionally intruded. The tools developed to manage them, including diversifying suppliers, holding strategic reserves, and maintaining spare capacity, were mainly built for that market-driven world.

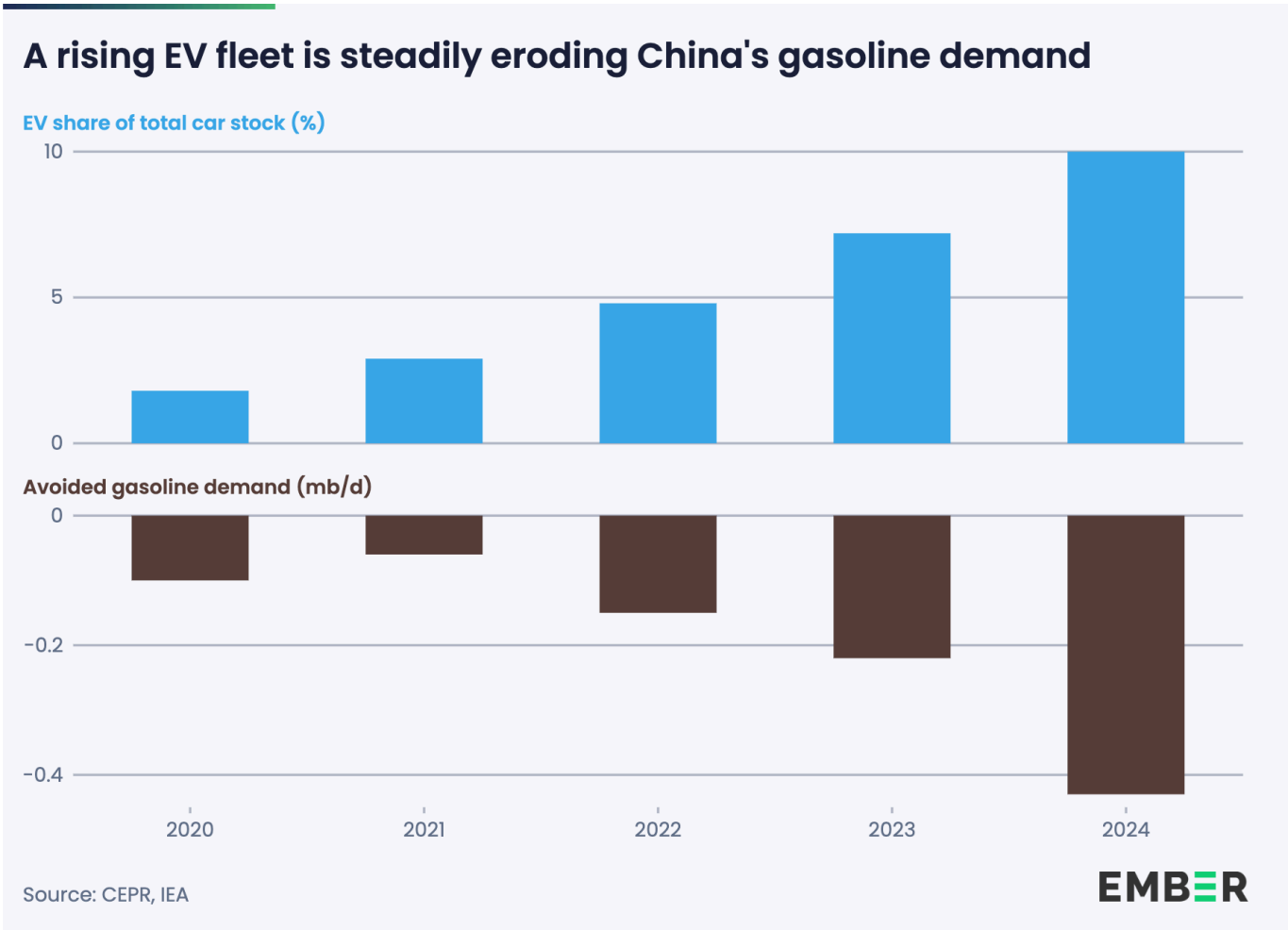
When supply disruptions are increasingly driven by conflict, the contest over critical chokepoints, and the deliberate use of energy as an instrument of leverage, managing market exposure alone is not sufficient. Reserves and diversified suppliers can cushion a shock, but they cannot address its source, because no country can reliably manage geopolitical risk. The more durable approach is not to manage exposure to fossil-fuel volatility but to reduce that exposure altogether.

China's Hormuz exposure is the largest of any economy in absolute terms. It imports roughly as much through the strait as India, South Korea and Japan combined. In relative terms, the strait accounts for a smaller share of China's oil imports than it does for those three countries. But that share is still over half, and because it sits on top of a far larger import base, the absolute volume at risk is greater.



Despite this, China's exposure to a Hormuz disruption looks more contained than the raw import volumes suggest. Part of this rests on conventional tools such as diversified suppliers and large strategic reserves. But China's rapid transport electrification adds a further layer of resilience, by reducing the volume of oil its economy needs in the first place.

The effect is already measurable. In 2024, EV adoption displaced an estimated 0.43 million barrels a day of gasoline use, up from about 0.10 million barrels a day in 2020 — around 12% of gasoline used that year (3.6 mb/d). With China targeting an EV stock share of 30% by 2030, more than double the 14% reached in 2025, the oil the economy needs would continue to fall. That known, declining trend is itself a source of resilience, one that strategic reserves and diversified suppliers, which only cushion a shock, cannot offer. And it is not unique to China: for any economy dependent on imported fossil fuels, the energy transition offers an expanding layer of energy security in a global market where the old tools increasingly fall short.



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3.2 Economic growth beyond rising fossil-fuel use

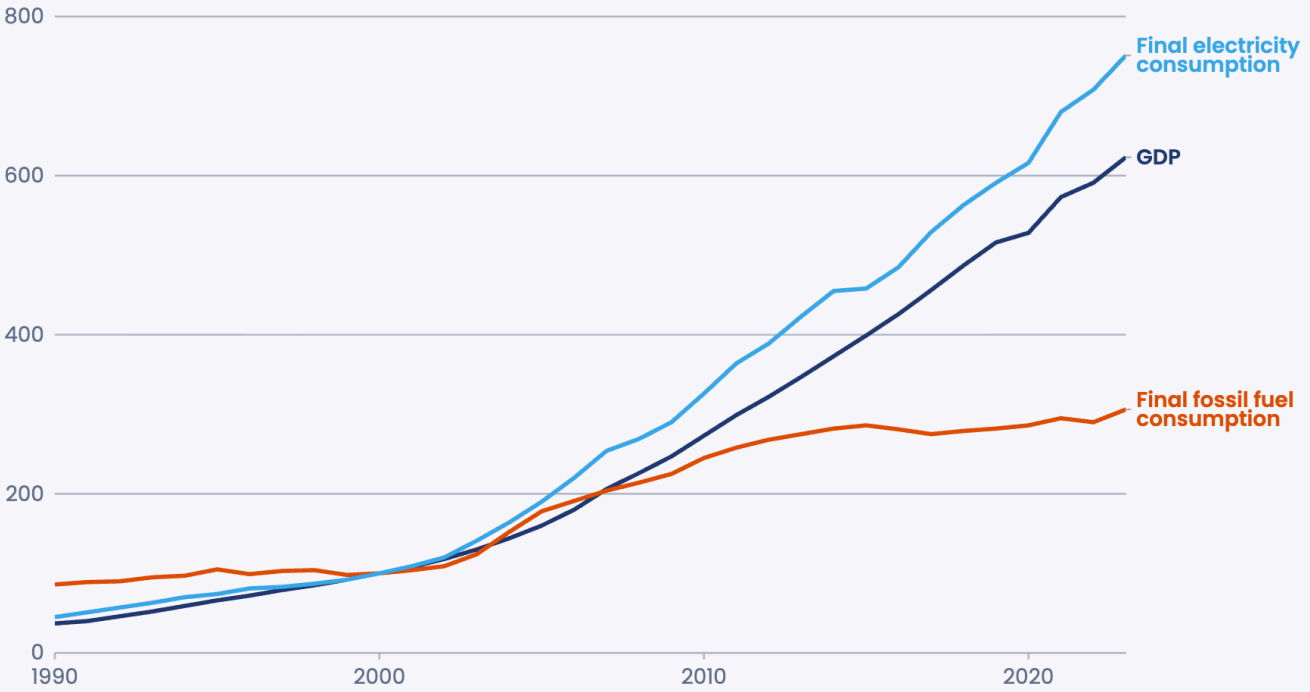
Fossil-heavy development looks like the proven path for good reason. It was the route followed by the Western industrialised economies, and later by Japan, China and a few others. Coal, oil and gas powered the factories, transport networks, heavy industries and cities that drove export-led growth.

Few economies embody that model's success more fully than China. Its fossil-fuelled industrialisation supported decades of unprecedented economic expansion. It therefore had strong reasons to remain anchored to the system that delivered its rise. Instead, as earlier chapters have shown, China is now working to rebase more of its industrial growth on a cleaner electric foundation.

The pattern is visible in the long-run data. Since 1990, China's economy has grown steadily, accompanied by a rapid rise in electricity use. Meanwhile, fossil-fuel consumption, after climbing steeply through the 2000s, has flattened over the past decade or so. GDP growth, in other words, has increasingly moved in step with electricity use, even as its link to fossil-fuel consumption weakens.

China's economic growth is increasingly coupling with electricity, not fossil fuel use

Indexed trends, 2000=100



Source: World Bank (GDP), IEA Energy Balances (energy use)
Note: GDP is measured in constant 2015 US dollars, while final electricity and fossil fuel consumption are measured in petajoules (PJ). Each series is indexed to 2000 = 100 by dividing its annual value by the corresponding value in 2000 and multiplying by 100.

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Decoupling is not unique to China. In many developed economies, industrial fossil-fuel use per capita has fallen relative to industrial value-added per capita – most sharply in the United Kingdom, more gradually in Japan and Germany. But in those cases, industrial value-added per capita has stayed broadly flat. The United States sits somewhat apart. Its industrial value-added per capita has risen modestly since 1995, while fossil-fuel use per capita has held roughly level rather than falling. What makes China's case especially relevant for developing countries is that it decouples while its industry is still expanding quickly: industrial value-added per capita keeps climbing, even as fossil-fuel use per capita has fallen back from its early-2010s high.

This decoupling is far from complete. But what matters most at this stage is the direction of travel, which so far shows little sign of reversing. And its implication for other developing countries is significant. It challenges a long-held assumption that fossil-intensive industrialisation is the inevitable price of development, and suggests instead that growth and decarbonisation can, increasingly, be pursued together.

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In China, industry keeps growing but its fossil fuel use has turned the corner

Industrial value-added and industrial fossil fuel consumption per capita, percentage change since 1995 (1995=0%)



Source: World Bank (industrial value-added, constant 2015 US$; population) and IEA World Energy Balances (industrial fossil fueluse)
Note: Each line shows the percentage change in per-capita industrial value-added or per-capita industrial fossil fuel use relative to 1995, so every series starts at 0% in that year (1995 = 0%). A value of +400% means the per-capita figure is five times its 1995 level.

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3.3 Global fossil-fuel demand growth is losing its historical engine

For much of this century, China has been the single largest driver of global oil and coal demand growth. Between 2000 and 2025, it accounted for roughly half of the entire global increase in oil demand, and for more than 90% of the growth in coal demand. That is now changing. China's oil and coal demand growth has slowed markedly in recent years, driven by the rapid growth of clean electricity and end-use electrification. As set out in the latest Five-Year Energy Plan, oil and coal consumption are expected to peak by 2030, and electrification is set to reach 35%, up from about 30% in 2025.

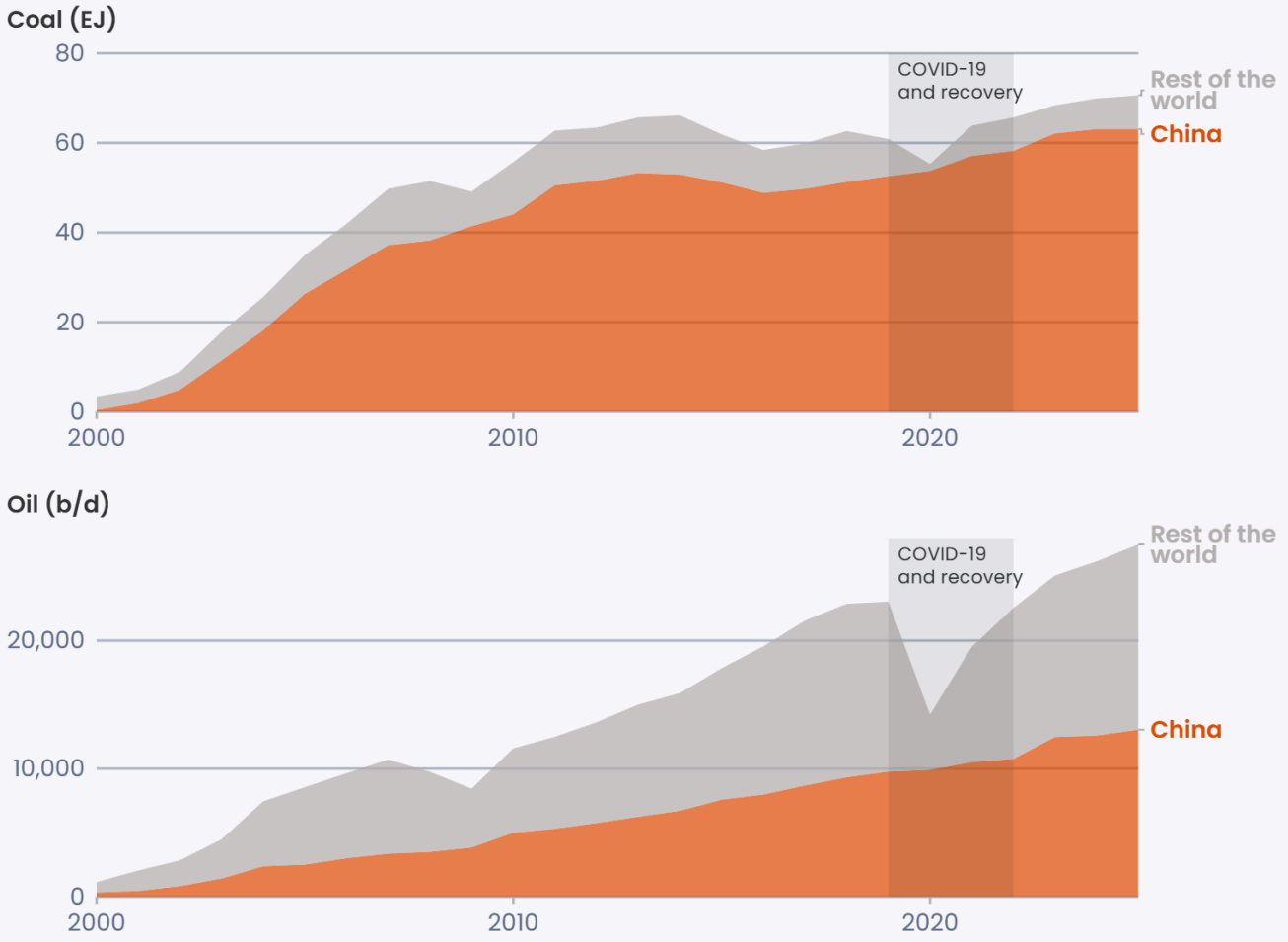
This marks a turning point for global markets, with significant implications for fossil-fuel exporting economies. For oil, the shift is already visible. China's gasoline demand has begun to edge down as electric vehicles displace petrol and diesel, and industry estimates it could fall around 5.5% in 2026. Coal might seem a different case, since China meets most of its coal needs from domestic production, so a peak in Chinese demand could be assumed to matter little to exporters. But that overlooks scale. In absolute terms, China is the world's largest coal importer, buying roughly 550 million tonnes in 2024 — around a third of all internationally traded coal.

For economies whose public budgets and development plans rest on fossil-fuel export revenues, then, a peak in Chinese demand would substantially weaken the assumption on which fossil-fuel investment has long rested: that demand will keep climbing.

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Since 2000, China has powered the rise in global coal and oil demand

Cumulative change in demand, 2000 to 2025



Source: Estimated based on Energy Institute's Statistical Review of World Energy
Note: For each year, demand is compared with its 2000 baseline, and these annual differences are accumulated over time. A point for a given year represents how much more coal or oil was consumed that year than in 2000.

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Overall, China's energy system is still like a ship being repowered at sea, where much of the harder work described in this report is still underway. What will confirm whether this course holds is not any single milestone, but whether the signs traced through this report keep extending: coal generation continuing to stall in more provinces, fossil-fuel use turning down rather than merely flattening in heavy industry, and the economic case for the transition continuing to outweigh the cost of the fossil-fuel system it is replacing. If it does, the significance will reach far beyond this one ship.

Methodology

This report draws on data from Chinese official sources, principally the National Bureau of Statistics (NBS), the National Energy Administration (NEA) and the China Electricity Council (CEC), alongside international sources including the International Energy Agency (IEA), the World Bank and Ember's own datasets. Where data for the most recent year is not yet available, the latest available year has been used, and monthly data is drawn on where it offers a more current picture. Ember's monthly China electricity data is based on NBS and NEA figures with some processing; full details are set out in our methodology. Some figures rely on estimation. Where this is involved, the method is set out in the notes to the associated table or figure.

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Designed by Reynaldo Dizon

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