

REPOWER

Repower China Brief

Coal power in the 15th Five-Year
Plan: a clear direction, an unclear
pathway

MAY TO AUGUST 2026

Repower China Brief

Issue covered from May to August 2026

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TAKE-AWAYS

Role Rebalancing: China is shifting coal power from a primary generation role towards system support and flexibility, while retaining its role in ensuring power-system reliability.

Transition Economics: The technical costs of coal-power flexibility are becoming clearer, but the revenue mechanisms needed to make the transition economically viable remain unresolved.

The Heat Problem: Power generation is decarbonising steadily, but clean sources still supply only around 2.3% of centralised heat, and most industrial heat demand requires high temperature.

KEY STATISTICS

TOTAL INSTALLED POWER CAPACITY	COAL POWER INSTALLED CAPACITY	NEW-TYPE ENERGY STORAGE
2025 3,890GW	2025 1,240GW	2025 136GW
2030 5,400GW	2030 1,500GW	2030 300GW

OPINIONS

From Planning to Implementation: Challenges in a phased Transition

Policy has redefined coal power as a backstop and a source of flexibility. The economics remain unclear.

Following the 15th Five-Year Master Plan released at the beginning of this year, China has issued sector plans for the energy system, translating the framework documents into measurable targets. Across these plans, the role of coal power is consistently defined as shifting from a primary power source to a supporting and regulating resource.

A clear direction, however, does not mean a clear pathway. Investment in coal flexibility retrofits continues to rise while coal generation declines. The narrative has shifted from ‘whether to transition’ to ‘how to do so in an economically viable way’. A key opportunity is to turn flexibility retrofits from a one-off investment into the starting point for the long-term transition of coal plant sites.

Constraint No.1: Reliable capacity from renewables is still low.

While coal power is asked to shift towards a supporting and regulating role, it remains its backstop role in the coming decades. Why is this the case? Because there is no reliable replacement yet. By 2030, wind and solar are expected to account for more than 50% of China’s installed power capacity, yet under the Renewable Energy Plan, their national average capacity credit¹ is expected to reach only 8%. This means that, at a 95% confidence level during supply-security periods, wind and solar, including co-located storage, would be counted on to provide around 8GW of reliable capacity out of 100GW installed. By comparison, on the nearest equivalent metric — the equivalent availability factor (EAF) — coal units were available for 91–93% of their installed capacity². The gap is widening rather than closing: computing load is growing quickly and offers limited flexibility, adding a further balancing requirement to a grid that must already absorb a rising share of variable renewables.

Constraint No.2: Clean Heat is unsolved.

China’s electricity generation continues to decarbonise rapidly, yet a large number of coal units have to be kept as they are CHPs supplying district heating in northern China and high-temperature industrial steam across the country. According to Repower’s analysis, clean sources currently account for only around 2.3% of centralised heat supply. Furthermore, over 80% of industrial heat demand requires steam above 200°C — a level that is difficult to meet through heat pumps or other electrification options alone.³

By 2030, wind and solar will be counted on for 8% of their capacity at peak. Clean sources supply 2.3% of centralized heat. That is why coal plants cannot readily exit the system.

¹ Capacity credit refers to the share of installed capacity counted during supply-critical periods. In China’s policy framework the metric is defined for wind and solar only.

² NEA and CEC, 2024 National Power Reliability Annual Report, March 2025: equivalent availability factor of 91.21% for 1,000 MW-class units, 91.82% for 600 MW-class and 92.57% for 300 MW-class.

³ Repower, Coal Power Asset Transition Strategy, August 2026.

Constrained by heat-led operation, CHP units have very little room to reduce load well below 40% a target set by new plans unless introducing power and heat decoupling measures.

Constraint No.3: Rising costs and uncertain returns

On the cost side, greater flexibility comes at the cost of fuel efficiency.

The New Power System Plan caps the increase in coal consumption under low-load operation at 25%, recognising the efficiency penalty associated with deep load cycling. For a 1GW unit, for example, reducing load from 40% to 20% can increase coal consumption by 46 gce/kWh⁴, about 15% of the national average in 2025⁵. This directly increases fuel costs. When thermal storage is added, heat losses during charging and discharging, along with the electricity consumed by auxiliary equipment, further increase operating costs. The flexibility retrofit itself also requires up-front capital investment.

On the revenue side, generation is declining and the compensation mechanism is not yet in place. Coal power utilisation hours continue to fall. In 2025, coal-fired units averaged 4,346 operating hours, 269 hours less than in 2024⁶. Thermal generation rose with demand in the first half of 2026 but fell 3.5% year on year in July and 4.3% in August⁷ — output is not only shrinking but also more volatile. The direction of compensation reform is settled; the details are not. The New Power System Plan calls for reliable capacity to be compensated under a unified standard, but how that standard will be set, and whether flexibility services will be adequately compensated, remain to be clarified.

Repower's assessment of domestic thermal storage projects also highlights this uncertainty.⁸ The payback period of a hot-water thermal storage project in Northeast China ranges from 1.9 to 7.1 years, depending mainly on annual dispatch frequency and how far capacity revenues are realised. The storage project's long-term value is limited concerning the facility cannot be reused once the coal plant retired. **Where retrofit investment serves only a unit's remaining life, its economics are difficult to secure.**

Flexibility clearly has value to the system. The question is whether that value reaches the plant that pays for the retrofit. Until the compensation standard is set, it remains uncertain.

Outlook: Repowering as a complementary pathway for coal transition

China has made plans to address these constraints. On the supply side, capacity credit targets are set for the first time, with new centralised wind and solar stations required to reach at least 10%. On the system side, new-type storage is to rise from 136GW to 300GW, and inter-provincial mutual

A retrofit does not have to be a burden on the transition. It can be the first step of what comes next.

⁴ State Grid Zhejiang Electric Power Research Institute, cited in China Power News Network, September 2023.

⁵ China Electricity Council, China Electric Power Industry Annual Development Report 2026 (2025 data): 301.9gce/kWh for thermal power plants of 6,000 kW and above.

⁶ China Electricity Council, 2025 national power industry statistics.

⁷ National Bureau of Statistics, Energy Production in July 2026 and Energy Production in August 2026.

⁸ Repower, Coal Power Asset Transition Strategy, August 2026. The cases are a hot-water thermal storage project at a CHP unit in Northeast China and the molten salt thermal storage project in Suzhou, Anhui Province.

support from 80 GW to 120 GW. On price, capacity payments are to recover at least 50% of coal's fixed costs, and reliable capacity is to be compensated under a unified standard.

Repowering can add to China's existing plans drawing attention to a new model of coal plant transition, where plant operators can maximise the reusable assets including standalone high-temperature thermal storage, heat networks, standardised interfaces that can connect future heat sources such as nuclear or geothermal, and site and grid infrastructure, retain their value. In addition to the social and economic story, repowering fits in time.

- **It fits to a phased transition.** Repowering does not require replacement in one step. High-temperature thermal storage can ease peak regulation and heat supply constraints during the 15th Five-Year Plan period, then serve as the link between a reactor and the existing turbine or continue as a standalone storage facility.
- **It provides a long-term answer, not a life extension.** Extending a unit's life defers the decision without changing the carbon profile of the asset. Repowering cuts emissions while retaining the value of the site, the grid connection, the heat network and the technical team.
- **Computing demand provides a use case.** Data centre electricity demand is growing well above the national average and requires firm, round-the-clock clean power. Grid connection capacity, cooling water, land and proximity to load are the hardest things for a new computing facility to secure — and existing coal sites already have them. At Cottam in the UK, a retired coal site is to host small modular reactors (SMRs) powering a new data centre.
- **Nuclear policy supports the option.** The Energy-Sector Conservation and Carbon Reduction Action Plan (2026–2028) supports nuclear heat and steam supply and the inclusion of nuclear power in the green electricity and certificate systems, and the AI–Energy Action Plan explores direct nuclear supply to computing facilities.

The future of coal power assets need not be a choice between retention and closure. Considering each retrofit over the full life cycle of the site could help existing coal plants shift from being a burden on the transition to becoming a starting point for clean energy development.

Further Reading

*A GUIDE TO THE POLICIES,
COOPERATION AND RESEARCH
COVERED IN THIS BRIEF*

CHINESE POLICIES (national level)

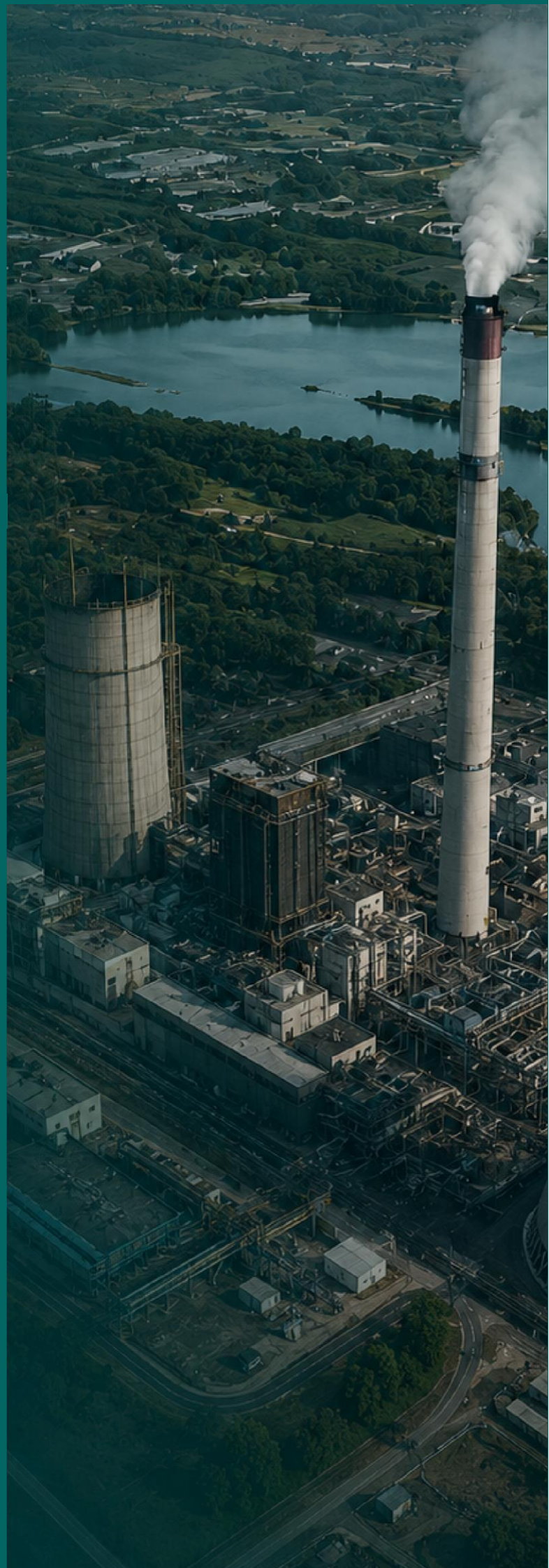
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1. Chinese Policies

1.1 Sectoral plans of the 15th Five-Year Plan Outline

Following the 15th Five-Year Plan Outline, the National Development and Reform Commission (NDRC) and the National Energy Administration (NEA) have issued a series of sectoral plans for the 2026–2030 period, alongside a three-year action plan. Those most relevant to the transition of the energy system are:

- [The 15th Five-Year Plan for Building the New Energy System](#) (published 25 June 2026), which sets the overall targets for the energy system and defines the role of each energy source;
- [The Action Plan for Energy Conservation and Carbon Reduction in the Energy Sector \(2026–2028\)](#) (published 10 July), which translates the policy direction into three-year implementation tasks, including thresholds for coal unit retirement and carbon-intensity requirements for certain retrofit projects.
- [The 15th Five-Year Plan for Renewable Energy Development](#) (published 23 July 2026), which, for the first time, sets targets and tasks for the reliable replacement capability of renewable power;
- [The 15th Five-Year Plan for Building the New Power System](#) (published 3 August 2026), which sets specific requirements on system adequacy, regulating capability and coal power retrofits;

Together, these plans and the accompanying action plan translate the direction set by the previous China Brief's framework documents into measurable targets for 2030 and a three-year task list, setting out both the technical requirements for coal power retrofits and clearer boundaries for the investment they involve.

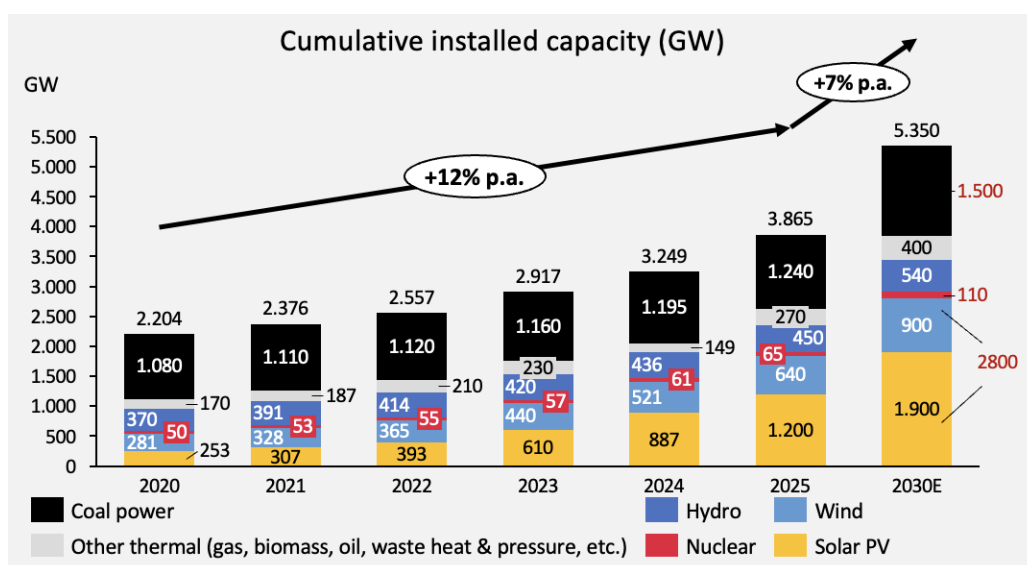
These plans set out the main targets for energy and power development over the 15th Five-Year Plan period (see table below). Comprehensive energy production capacity, the share of non-fossil energy in consumption and the reduction in carbon emissions per unit of generation are binding targets; the others are anticipated targets.

No.	Indicator	Unit	2025	2030	Type
1	Comprehensive energy production capacity	billion tce	51.3	58	Binding
2	Total installed power capacity	GW	3,890	5,400	Anticipated
3	Share of non-fossil energy in consumption	%	21.7%	25%	Binding
4	Share of non-fossil sources in installed power capacity	%	61.7%	65%	Anticipated
5	Share of non-fossil sources in power generation	%	42.3	50	Anticipated
6	Share of electricity in final energy consumption	%	30	35	Anticipated
7	Reduction in carbon emissions per unit of generation	%	Baseline	>10	Binding

Other sectoral plans set corresponding targets on the supply side. For coal, [the 15th Five-Year Plan for Coal Industry Development](#) targets a peak in coal consumption by 2030, at least 100 million tonnes per year of coal production capacity reserves, and an 87% share of capacity from large, modernised mines. For oil, the plan targets a peak in oil consumption while maintaining annual crude oil production at around 200 million tonnes.

Taken together, these plans point to the following features of energy and power development during the 15th Five-Year Plan period:

- **Energy supply continues to grow, alongside further progress on decarbonisation.** Total energy production capacity is set to rise from 5.13 billion tonnes of coal equivalent (tce) in 2025 to 5.8 billion tce in 2030, a cumulative increase of about 13%, or roughly 2.5% a year. Over the same period, the share of non-fossil energy in total energy consumption is set to rise from 21.7% to 25%, and its share of power generation from 42.3% to 50%. Wind and solar are expected to account for more than half of total installed capacity.
- **Electrification continues to advance.** The share of electricity in final energy consumption is set to rise from 30% to 35%, pointing to continued strong growth in power demand.
- **Around 1,510 GW of new capacity will be added, and coal capacity will still grow, though more slowly than renewables and nuclear.** Total installed capacity is set to rise from 3,865 GW to 5,350 GW (see chart below).



By our analysis, coal capacity will grow at 3.9% a year over 2025–2030, up from 2.8% over 2020–2025, while wind, solar and nuclear will grow at 7.1%, 9.6% and 11.1% respectively (see table below).

Capacity CAGR	Coal power	Wind	Solar PV	Nuclear
2020–2025	2.8%	17.9%	36.6%	5.4%
2025–2030	3.9%	7.1%	9.6%	11.1%

- **Energy conservation and carbon reduction in the power sector focus on replacing coal capacity and upgrading technology.** *The Action Plan for Energy Conservation and Carbon Reduction in the Energy Sector (2026–2028)* sets out two measures:
 - 1) **Capacity replacement:** retiring in a steady and orderly manner all eligible coal units of 300MW class and below and encouraging replacement units built to next-generation coal power standards.
 - 2) **Technology upgrading:** cross-generation upgrades of 600MW-class units to supercritical or ultra-supercritical configurations. The plan also aims to raise the share of coal capacity meeting current energy efficiency benchmarks by 15 percentage points by 2028.
- **Renewable integration is expanding, but reliable replacement capacity remains a constraint.** The action plan calls for accelerating new-type energy storage, exploring long-duration storage and

expanding inter-provincial trading of renewable power. In line with this, *the New Power System plan* sets targets to raise new-type storage capacity from 136GW to 300GW and inter-provincial power mutual-support capability from 80GW to 120GW, while keeping the utilisation of nationally available renewable electricity at around 90%. *The Renewable Energy Development plan* targets an 8% capacity credit for wind and solar (around 11% for wind and 6% for solar, including co-located storage), which could explain why the same plans that require coal power to take on a greater regulating role also retain its backstop function.

- **For coal flexibility retrofits, the cost is now quantified, but the compensation mechanism is not yet operational.** The 25% cap on the increase in coal consumption at low load, together with the target of bringing CHP units below 40% minimum output, defines the efficiency penalty of deep cycling and highlights the greater retrofit challenge faced by cogeneration plants. On returns, a commitment to establish a reliable-capacity compensation mechanism based on a unified principle could provide a basis for more stable returns on retrofit investment, but the standard itself and the implementation pathway have yet to be defined.
- The heating system is moving towards low-carbon supply. The action plan sets out three measures:
 - 1) **Multiple heat sources:** developing wind- and solar-powered heating, geothermal, biomass heating, nuclear heating and waste heat recovery according to local conditions.
 - 2) **Thermal storage (for heating or cooling):** building storage systems at large heat sources and main heating network lines where conditions allow, encouraging storage in areas with concentrated heating and cooling demand such as renewable heating projects and industrial parks, and exploring long-duration thermal storage in suitable regions.
 - 3) **Smart dispatch:** establishing a smart dispatch system for heating networks.

These measures are consistent with [the 15th Five-Year Plan Carbon Peaking Action Plan](#)'s support for thermal storage at CHP plants, and with the New Power System Plan's call for heat–power decoupling to improve coal-fired power flexibility.

1.2 Computing-power and Electricity Coordination

The [Action Plan on Two-Way Empowerment between Artificial Intelligence and Energy](#), issued on 8 May 2026 by the NDRC, NEA, MIIT and NDA is a key publication. It is the first national plan to systematically pair artificial intelligence with energy, setting out 29 priority tasks and targets for 2027 and 2030. Among its requirements, those with a direct bearing on the power system and on existing power plant sites include:

- **Energy supply:** to "coordinate the planning and siting of large renewable energy bases and national computing hubs", and to "explore the joint development of gigawatt-scale AI computing facilities and their supporting energy systems, with pilots in regions where conditions allow".
- **Direct supply:** to "explore the supply of computing facilities directly with nuclear power, hydrogen and other energy sources".
- **System support:** to "encourage computing **facilities** to install grid-forming storage, strengthening supply stability and their active support to the power system".
- **Market participation:** to "encourage computing facilities to act as adjustable demand-side resources in grid operation", to "support their participation in the energy, ancillary service and demand response markets in various forms", and to "encourage new computing facilities to sign multi-year green power contracts with renewable generators".

WHY IT MATTERS

Computing-power and electricity coordination may seem like a digital infrastructure issue, but it could create new demand for existing power plant sites.

- **Computing load requires firm, clean and reliable power supply.** *The policy therefore promotes direct access to green power, encourages grid-forming storage at computing facilities and, for the first time, explores direct nuclear supply.*
- **Existing site assets are becoming scarce.** *Grid connection capacity, cooling water, land and proximity to load can be difficult for new computing facilities to secure — and are already available at many existing coal sites.*

Whether computing supports the clean transition will depend on its power source: prioritising low-cost power and rapid connections could reinforce reliance on coal as a backstop.

1.3 Nuclear Public Communication and Social Acceptance

The [*Notice on Establishing the "Green Nuclear Energy" Public Communication Platform*](#), issued on 30 June 2026 by the General Office of NEA and the General Office of MEE, upgrades public communication on nuclear power from separate company efforts into a standing industry-wide coordination mechanism. Its stated aim is to strengthen communication on nuclear power and nuclear safety, help the public understand nuclear energy correctly and build a supportive social environment for its development. Guided by the NEA and the MEE (National Nuclear Safety Administration), the platform is co-initiated by the China Nuclear Power Development Centre, the Nuclear and Radiation Safety Centre and the Chinese Nuclear Society, with CNNC, Huaneng, SPIC and CGN as lead enterprises. Its main tasks include:

- **Opening sites to the public:** Public communication is to become routine in government bodies and schools, while nuclear bases, research facilities and science venues are to widen public access and develop study tours and industrial tourism routes.
- **An industry expert pool:** A pool of communication experts is to be established, with experts made available to the media on nuclear developments and safety issues at home and abroad.

WHY IT MATTERS

Discussion of coal-to-nuclear (C2N) conversion tends to focus on technology and cost, yet whether a site can proceed also depends on local public acceptance.

For existing sites, this matters in concrete terms: conversion would take place in relatively populated areas, where communities may have concerns not only about nuclear safety but also about jobs and local development. Social acceptance therefore needs to be considered alongside site screening, rather than after project approval.

2. Industry & International Cooperation

Interest in repowering among China's power companies rose visibly during this reporting period: CHN Energy commissioned preparatory research on C2N conversion, and the China Electricity Council (CEC) received the Repower delegation. Repower also set out the case for repowering at two bilateral energy forums, in Chengdu and Taiyuan. An interview on Poland's DEsire project adds international experience of direct relevance to China.

2.1 CHN Energy commissions preparatory research on C2N

In May 2026, CHN Energy's Economic and Technological Research Institute issued an open tender covering advanced nuclear technology, including domestic and overseas site reserves for C2N conversion, technology integration and standards, and siting for thorium molten salt reactors (TMSRs). The tender also includes recommendations for a 20MW-class demonstration project.

CHN Energy, one of China's largest coal-power operators, is the first to publicly tender group-level C2N preparatory research. However, TMSR remains a long-dated option: China's programme is still at the experimental and R&D stage, with a 100MW-class demonstration project targeted for around 2035.

2.2 CEC meets the Repower delegation



On 8 September, the Repower delegation visited the China Electricity Council (CEC) in Beijing and met with its Chief Supervisor, Mr Yuelong Pan. Discussions covered the role of coal power in the new power system, flexibility retrofits, the repurposing of existing coal assets, and electricity market and industry policy.

CEC highlighted that coal power will remain an important source of system flexibility and support as China works towards its 2060 carbon neutrality target, providing inertia, frequency support and cogeneration. It also noted that China's three-pronged retrofit programme covering efficiency, heat supply and flexibility is already well advanced. Repower presented the RepowerScore assessment tool and international experience, highlighting the value of retaining existing grid connections, industrial land, heat networks and technical teams to reduce transition costs, shorten delivery times and minimise disruption to local communities.

Both sides agreed on the importance of the clean transition of coal power and expressed interest in further information sharing on coal power transition, clean heat substitution and next-generation coal upgrades, including through

joint workshops, expert exchanges and engagement with CEC technical committees.

2.3 Highlights in the international cooperation on the energy transition

Repower was invited to deliver the presentation, “Repowering China: Unlocking New Pathways in the Energy Transition”, at two energy forums during the UK Day of the 4th EU-China Energy Technology Innovation Cooperation Forum in Chengdu on 24th June, and the UK-China Energy Transition Forum in Taiyuan on 4th September.

Bogi Højgaard CEO of Repower emphasised in the presentations that clean heat is harder to achieve while C2N and other repowering pathways provide the alternatives for China’s energy transition.

Baroness Bryony Worthington, Board member of Repower shared to the [local media in Shanxi province](#) a number of technology options. In addition to mature renewable energy and battery storage technologies, she said emerging solutions such as advanced nuclear energy could offer new possibilities for Shanxi in the future.

As premier national-level international forums in the energy sector, these two conferences highlight the critical importance of coal transition in global cooperation. Furthermore, they demonstrate that the 'repowering' model is highly suited to China's practical realities.



[Poland’s case](#) was featured in the EU-China Energy Magazine in August. The magazine is published by the EU-China Energy Cooperation Platform (ECECP), launched in 2019 as one of the main channels for energy dialogue between China and Europe. It appears in both Chinese and English and reaches government bodies, energy companies and research institutes on both sides.

SUMMARY

Across these exchanges, the focus has shifted from whether coal plants should close to how their sites and infrastructure can be reused.

The different repowering pathways vary in maturity rather than ambition. Thermal storage already has projects operating in China, while C2N remains at the research and site-screening stage. Poland's experience reaches policy and industry readers in China and shows that the transition of coal plant sites is becoming a shared topic in EU-China energy dialogue.

3. Publications

One institutional report and two peer-reviewed papers were published during the reporting period, covering China's nuclear sector, the potential for C2N conversion, and the performance of thermal storage retrofits at coal-fired units.

Institutional Report: China Nuclear Power Development Report (2026)

Compiled by the China Nuclear Power Development Centre with the China Institute of Nuclear Industry Strategy and Hualong International Nuclear Power Technology Co., July 2026.

RESEARCH OVERVIEW

The report reviews the development of China's nuclear power sector during the 14th Five-Year Plan period and in 2025, covering operations, construction, technology, standards and supply chains. It also outlines the sector's outlook for the 15th Five-Year Plan period.

KEY FINDINGS:

- 1) **Total nuclear capacity has risen to the world's largest.** During the 14th Five-Year Plan period, 46 units totalling 54.5GW were newly approved, while 11 units totalling 12.45GW entered operation. By the end of 2025, China had 112 units in operation or approved and under construction, totalling 125GW. This included 59 operating units (62.48GW), ranking third globally, and 53 units approved or under construction (62.93GW), representing the largest such capacity in the world for 19 consecutive years.
- 2) **Generation and operating performance.** In 2025, nuclear power generation reached 485.2TWh, up 7.6% year on year, accounting for 4.6% of national power generation and 11.4% of non-fossil power generation. Average operating hours were 7,809 hours, equivalent to a capacity factor of 89.1%. Nuclear power has become an important source of clean electricity in China's eastern coastal provinces, accounting for 28.1% of power generation in Fujian, 20.9% in Liaoning, 18.5% in Hainan and 16.9% in Guangdong.
- 3) **Technology pathways are becoming more diverse.** Hualong One has entered the batch construction stage, while the Guohe One demonstration project has been fully completed. The Shidao Bay high-temperature gas-cooled reactor in Shandong is the world's first commercial demonstration plant using Generation IV technology. The 2MWt liquid-fuel thorium molten salt experimental reactor has achieved the first thorium-to-uranium nuclear fuel conversion, while construction of the Linglong One SMR demonstration project in Changjiang, Hainan, is progressing smoothly.
- 4) **Nuclear energy applications are expanding.** Four nuclear district heating projects across China now cover more than 19.75 million square metres. Heqi No. 1 at Tianwan, China's first demonstration project for nuclear-powered industrial steam supply, delivered more than 3.17 million tonnes of clean steam to the Lianyungang petrochemical base in its first year of operation, equivalent to reducing standard coal consumption by 264,200 tonnes and CO₂ emissions by 706,600 tonnes.
- 5) **Outlook for the 15th Five-Year Plan period.** The report expects coastal nuclear power construction to continue in a steady and orderly manner. As several reactor types reach a turning point from technical development to engineering application, it calls for accelerated R&D on Generation IV nuclear technology. Nuclear energy's multi-purpose applications are expected to expand further, including integration with clean heating and industrial steam supply. Nuclear power is also expected to gradually enter the electricity market, creating a need for further research on market participation mechanisms and for institutional arrangements that reflect the low-carbon value of nuclear power.

Academic Paper 1: Unveiling the coal-to-nuclear retrofitting potential in China through a safety-first assessment

He G., Wu X., Wang H., Guo Z., Fan J., Wang Y., Qvist S., Jing R., Zhang Y. (2026). Unveil the coal-to-nuclear retrofitting potential in China by a safety-first assessment. *Applied Energy*, 426, 128750. Available online 27 August 2026. Led by the College of Energy, Xiamen University; participants include the Institute of Nuclear and New Energy Technology, Tsinghua University; QuantifiedCarbon Ltd. (UK); and the Fujian Research Centre for Nuclear Engineering.

RESEARCH OVERVIEW

Existing C2N site-screening studies often overlook nuclear safety constraints and differences in siting requirements across reactor types. This study develops a **safety-first, two-stage siting framework** and applies it to around 1,300 coal-fired power plant sites in China, covering three reactor types: the AP1000 large, pressurised water reactor, and the ACP100 and HTR-PM small modular reactors. The first stage screens sites against mandatory criteria for seismic hazard, hydrology and population density. Eligible sites are then prioritised based on unit operating status, urban resilience and regional electricity demand, using a combination of entropy weighting and analytic hierarchy process methods.

CORE CONCLUSIONS:

- 1) **China's C2N potential is estimated at around 325GW.** Under the baseline scenario, around 400 coal plant sites pass the screening, representing 25.6% of China's total installed coal capacity. If all sites were assessed for SMR deployment without emergency planning zone (EPZ) restrictions, the theoretical potential would reach 551GW. The authors stress that this is a theoretical upper bound and should not be regarded as near-term deployable capacity.
- 2) **Water availability and population density are the two main constraints.** Coastal areas are less sensitive to water-source distance, while inland regions show much greater variation. In Inner Mongolia, for example, potential increases from 5.5GW to 44.7GW when the water-source distance threshold is relaxed from 3 km to 20 km. Large reactors are more sensitive to population density within the EPZ, while SMRs have an advantage in densely populated areas because of their less restrictive EPZ requirements.
- 3) **Potential is unevenly distributed, with higher feasibility in the eastern coastal regions than in the west.** Coastal sites account for 39.3% of feasible sites. Guangdong, Jiangsu, Shandong and Henan have the highest priority scores, combining stronger disaster resilience, high electricity demand, ageing plants approaching retirement and established nuclear power development experience.
- 4) **Different regions favour different repowering pathways.** Water-abundant, densely populated coastal areas such as Guangdong and Jiangsu are more suited to AP1000 conversion, making use of existing grid infrastructure. Water-constrained inland regions such as Inner Mongolia and Shanxi would rely more on SMRs or hybrid cooling solutions, but at higher capital cost. The reported levelised cost of electricity for SMRs is around 20% higher than for large PWRs, with their economics depending on construction time, the number of reactor modules and the extent to which existing coal plant infrastructure can be reused.

The authors note that realising this potential also depends on the EPZ requirements set by national siting regulations and on cultivating public acceptance, a process of building societal trust that matures over time.

Academic Paper 2: Peak-regulation performance of coal-fired units integrated with molten salt and heat pump thermal storage

Cao L., Xu J., Hou F., Li P. (2026). Peak-Regulation Performance of Thermal Power Plants Integrated with Molten Salt and Heat Pump Thermal Energy Storage. *Processes*, 14(13), 2190. Published 4 July 2026, open access. Led by the School of Energy and Power Engineering, Northeast Electric Power University, with the School of Electrical Engineering, Jilin Vocational College of Electronic Information.

RESEARCH OVERVIEW

Taking a domestic 600MW supercritical unit as the case, the study examines the peak-regulation performance of a coal-fired plant integrated with molten salt and heat pump thermal energy storage. It analyses load response, regulation capability and the effect of different heat-release configurations on thermal performance.

CORE CONCLUSIONS:

- 1) **The two storage technologies have different applications.** Molten salt storage responds more slowly due to thermal inertia and heat transfer lag and is better suited to deep integration with the unit under high-load, high-quality steam conditions. Heat pump storage responds faster and offers greater flexibility across the full load range, making it particularly suitable for deep peak regulation at low load.
- 2) **A small efficiency loss can deliver a significant gain in flexibility.** Thermal storage slightly reduces the unit's thermal efficiency due to heat-transfer losses, but the authors consider this trade-off worthwhile, given the improvement in flexibility and its engineering value for power systems with a high share of renewables.

The study does not include a detailed economic assessment.

ABOUT THE BRIEF

Repower China Brief provides a regular overview of Chinese policies, industry trends, and cutting-edge research regarding the nation's energy transition and renewable energy development. The current focus centres on three core pillars: power system upgrades, coal-to-clean energy transitions, and nuclear power.

The brief is compiled by the Repower Initiative's China team and reviewed by the Repower network of experts. Our mission is to accelerate decarbonisation by repurposing existing coal assets and optimising critical energy resources. Consequently, this brief offers a specialised lens on innovative pathways for the transition of coal-fired power infrastructure.