## China

# Entering new phase led by world's largest coal power CCS project

**China's CCS efforts are entering a transformative phase, characterised by large-scale demonstration projects and the adoption across sectors. While the country is still in the early stages of developing its national policy and regulatory framework, this new phase is being boosted by positive policy signals and tailored tools. China is on track to scale up CCS deployment around 2030, with the extent of success contingent upon continued advancements in technology, the success of demonstration projects, policy and regulatory developments, and the evolving landscape of global climate governance.**

**Milestone** – Huaneng's 1.5 Mtpa project established China as a leader in the application of CCS to coal-fired power generation. The operation of this facility marks a breakthrough not just for China, but for the global CCS community. As the world's largest CCS project attached to a coal-fired power plant, it sends a signal: large-scale decarbonisation of fossil infrastructure is technically and operationally achievable.

**Foundation** – Positive policy signals are propelling China's CCS demonstrations into the new phase. Policy support for CCS in China has steadily strengthened since 2024, with clearer signals from the Central Government that incorporate CCS into sectoral transition plans, particularly within coal-fired power generation. Some policy programs specifically prioritise demonstrations that encompass the entire value chain. This clarity is empowering a new generation of more integrated projects capable of capturing higher volumes of $CO_2$.

**Progress** – Advancement remains strong across technology innovation, manufacturing capacity, and on-the-ground demonstrations as China's CCS ecosystem continues to mature. Chinese technology innovators and equipment providers are making progress in improving capture efficiency, reducing costs, and tailoring solutions to a broader range of industrial processes and contributing to global CCS projects.

**Momentum** – With the planning process for the country's 15th Five-Year Plan (2026–2030) underway, CCS will be shaped by whether and how it is embedded in national and sectoral development plans for the next five years. If formally included, CCS could benefit from clearer long-term policy certainty.


* The absence of plots on the Regional Spotlight - China map is intentional. The general location of facilities can be seen on page 6.

China continues to make steady progress in advancing large-scale CCS demonstrations[1] in 2025. A major global milestone was reached with the operation of Huaneng's 1.5 Mtpa CCS project — the largest of its kind at a coal-fired power plant anywhere in the world. This project, along with several other key project advancements, underscore China's growing technological and engineering capacity in the sector. Policy signals have remained supportive, guiding the rollout of CCS demonstrations across both heavy industry and the power sector.

## Projects

China's coal-fired power generation sector continues to lead the country's CCS efforts. In addition to the Huaneng project, China National Petroleum Corporation (CNPC) broke ground in April 2025 on a 1 Mtpa coal power CCS project in Xinjiang, which aims to scale up to 2 Mtpa in the future. In November 2024, China National Energy Investment (CNEI) Jinjie Company registered a 4 Mtpa coal power CCS project with the Yulin city government in Shaanxi. Although in the early stages of development, this project underscores CNEI's ambition in taking a leading role in deploying CCS for coal power decarbonisation.

In hard-to-abate industries such as the chemicals sector, CNEI Ningxia Company began operating a 500 ktpa CCS facility at one of its coal-to-liquids plants in Yinchuan city in September 2024. This project is part of a broader strategy to scale up to 3 Mtpa by 2030. As one of China's largest CCS initiatives in the coal-to-chemicals industry, it may demonstrate a viable low-carbon pathway for a sector that is both massive and still rapidly growing.

In the cement sector, Beijing BBMG Group has launched a 100 ktpa CCS demonstration project in Beijing, marking China's third operational CCS project in this industry. China Resources is also constructing a 60 ktpa cement CCS facility in Hainan. Both projects utilise amine-based capture technology. In 2024, China United Cement Group started an oxy-fuel combustion CCS project in the cement sector with an annual capture capacity of 200 kt (GCCSI, 2024), the largest in the world of its kind.

In the oil and gas sector, CNOOC launched China's first offshore $CO_2$-EOR project in May (SCIO, 2025). Located approximately 200 km southwest of Shenzhen, Asia's largest offshore oil production platform is now set to inject over 1 million tonnes of $CO_2$ over the next decade. In addition, CNPC began construction of a two-phase 400 km $CO_2$ pipeline in April, with a transport capacity of 4 Mtpa – four times larger than the capacity and length of China's first industrial-scale $CO_2$ pipeline in Shandong, owned by SINOPEC. The scaling-up of the $CO_2$ pipeline network will be a key enabler for more large-scale CCS projects across the country, further strengthening China's carbon capture and storage infrastructure.

## Cross-border

Dalian Shipbuilding Industry Co. delivered the first two liquid $CO_2$ transport ships to Norway's Northern Lights project in late 2024 (Offshore Energy, 2025b), marking a significant milestone in global CCS supply chain collaboration. In February 2025, the AGOGO FPSO, the world's inaugural floating production storage and offloading (FPSO) vessel equipped with offshore post-combustion carbon capture technology (Offshore Energy, 2025a) with a capacity of 230 ktpa (SASAC, 2025), was officially unveiled at COSCO SHIPPING Heavy Industry. This FPSO will be utilised by Azule Energy off the coast of Angola, a joint venture between bp and ENI. In June 2025, Shanghai achieved the world's first ship-to-ship offloading of liquefied $CO_2$ captured directly from a container ship (MarineLink, 2025).

## Policy

China continues to strengthen its climate policy while exploring policy tools for advancing CCS. Last August, the Chinese government made a clear commitment to shift from carbon intensity-based targets toward total emission cap as the primary target by 2030. In March, China unveiled a work plan to expand its carbon trading market to include the steel, cement, and aluminium industries. The three sectors together account for around 3 billion tonnes of $CO_2$ equivalent emissions annually. While this expansion may not immediately influence China's CCS deployment, the establishment of a mature carbon market as well as a carbon cap around 2030 will encourage companies to plan for long-term climate goals, including decisions regarding CCS.

On CCS, the Central Government has consistently signalled support for large-scale demonstrations, particularly within the coal-fired power generation sector. This policy commitment is reflected in at least three major policy documents:

- Action Plan for Low-Carbon Transformation and Construction of Coal Power Plants (2024-2027), released in July 2024.
- Opinions on Strengthening the Clean and Efficient Utilization of Coal, issued in September 2024.
- Implementation Program for the New Generation of Coal Power Upgrading Special Action (2025-2027), published in March 2025.

The Special Action also launched a call for proposals based on these policy frameworks. The selected coal power CCS projects will benefit from government support.

Meanwhile, the Advanced Green and Low-Carbon Technology Demonstration Project Implementation Program awarded funding to seven CCS projects in April 2025. These include three integrated CCS projects, a capture project in the cement sector, a long-distance $CO_2$ pipeline project, and capture projects at a fertiliser factory and a lithium-ion battery production facility.

[1] In China, demonstration projects can be operated for an entire project lifetime, not just a short period.

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# Huaneng Longdong: A global benchmark for decarbonising coal-fired power

The Huaneng Longdong Energy Base 1.5 Mtpa CCUS project represents a transformative leap in the global fight against climate change. It is the world's largest carbon capture facility integrated with a coal-fired power plant and China's most ambitious CCS initiative. This flagship facility, situated in Gansu province in China's west, pioneers a pathway for coal-dependent energy systems to achieve net zero emissions and establishes a replicable model for scalable, cost-effective carbon management worldwide.

**Key Impacts**

- Scale and Integration: Integrated with the 2 × 1000 MW Zhengning coal-fired power plant and paired with 6 GW of renewable energy, the project creates a hybrid energy infrastructure that balances fossil fuel reliability with renewables and CCUS. This ensures deep decarbonisation of the "last mile" of $CO_2$ emissions, setting a precedent for coal-to-clean transitions.
- Cutting-Edge Technology: At its core is Huaneng's proprietary HNC-7 hybrid solvent technology, which reduces energy consumption (≤2.3 GJ/tonne $CO_2$) and solvent consumption while minimising its environmental footprint. This breakthrough achieves a decarbonisation cost of under Yuan 220/ton $CO_2$, positioning it as a commercially viable, globally competitive solution.
- Full-Chain CCUS Demonstration: The facility showcases China's first large-scale, full-chain CCUS facility in the power sector, featuring the nation's deepest saline formation storage well and a supercritical $CO_2$ pipeline network capable of sequestering 200,000 tpa (rising to 500,000 tpa in Phase II). Real-time dynamic monitoring demonstrates permanent storage, enhancing trust in geological carbon management.
- Global Commercial Blueprint: By demonstrating mature, scalable $CO_2$ capture technology and a sustainable business model, Huaneng's project can help accelerate the global commercialisation of CCUS. It offers developing economies a pragmatic template to reconcile coal reliance with climate goals by illustrating that low-cost, high-efficiency carbon capture is achievable.

Huaneng Longdong CCUS project, image courtesy of Huaneng Clean Energy Research Institute.

## Catalyst for action

The Longdong Energy Base project illustrates China's leadership in CCUS innovation and helps to redefine the outlook for coal-powered energy. Its success underscores the critical role of advanced carbon capture in achieving net zero targets, offering a replicable framework to decarbonise heavy industries and fossil-dependent grids. As the most advanced commercial-scale CCS demonstration in the coal sector, this project is a cornerstone for accelerating global climate resilience and equitable energy transitions.