



**CCUS Demonstration Project (Phase I of 500,000 tons)
of Baogang Group Completed and Put into Production,
and Its Prospect for Diversified Applications**

Singapore, December 2025

Company Profile

- ❑ Founded in 1954 as one of the major 156 projects during the 1st Five-Year Plan, Baogang Group has formed an industrial system that consists of steels and rare earths as the main part and such other emerging sectors as resources and their integrated utilization, logistics, coals and cokes, energy conservation and environmental protection, equipment, and production and life services.
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- ❑ Baogang Group is an important mineral resource base in China. Its Baiyun Ebo Mine is a rarely seen ultra large mineral deposit with multiple symbiotic metals, including iron, rare earths and niobium. Its rare earth reserve is the largest, and its niobium and thorium reserves rank second in the world. It is also rich in various national strategic resources such as fluorite, scandium, and potassium.
 - ❑ Baogang Group is an important steel industry base in China. It has a supporting capacity to produce 17.2 Mt of iron, steel, and other materials. It has production lines to manufacture high-quality plates, pipes, rails and wires. It can produce high-end products such as high-speed rails, oil well casing, automotive steel, home appliance steel, high-grade pipeline steel, and high-strength structural steel.
 - ❑ It is the largest rare-earth base in China, and it ranks first in the world in rare earth beneficiation, smelting and separation, and metal production capacity and output.

Contents

01

CCUS is an Important Pathway for the Steel Industry to Achieve Carbon Neutrality

02

About CCUS Demonstration Project (Phase I of 500,000 tons) of Baogang Group

03

Prospect for Diversified Applications of Baogang CCUS Demonstration Project



PART

1

CCUS is an Important Pathway for the Steel Industry to Achieve Carbon Neutrality



CCUS is an Important Pathway to Achieve Carbon Neutrality

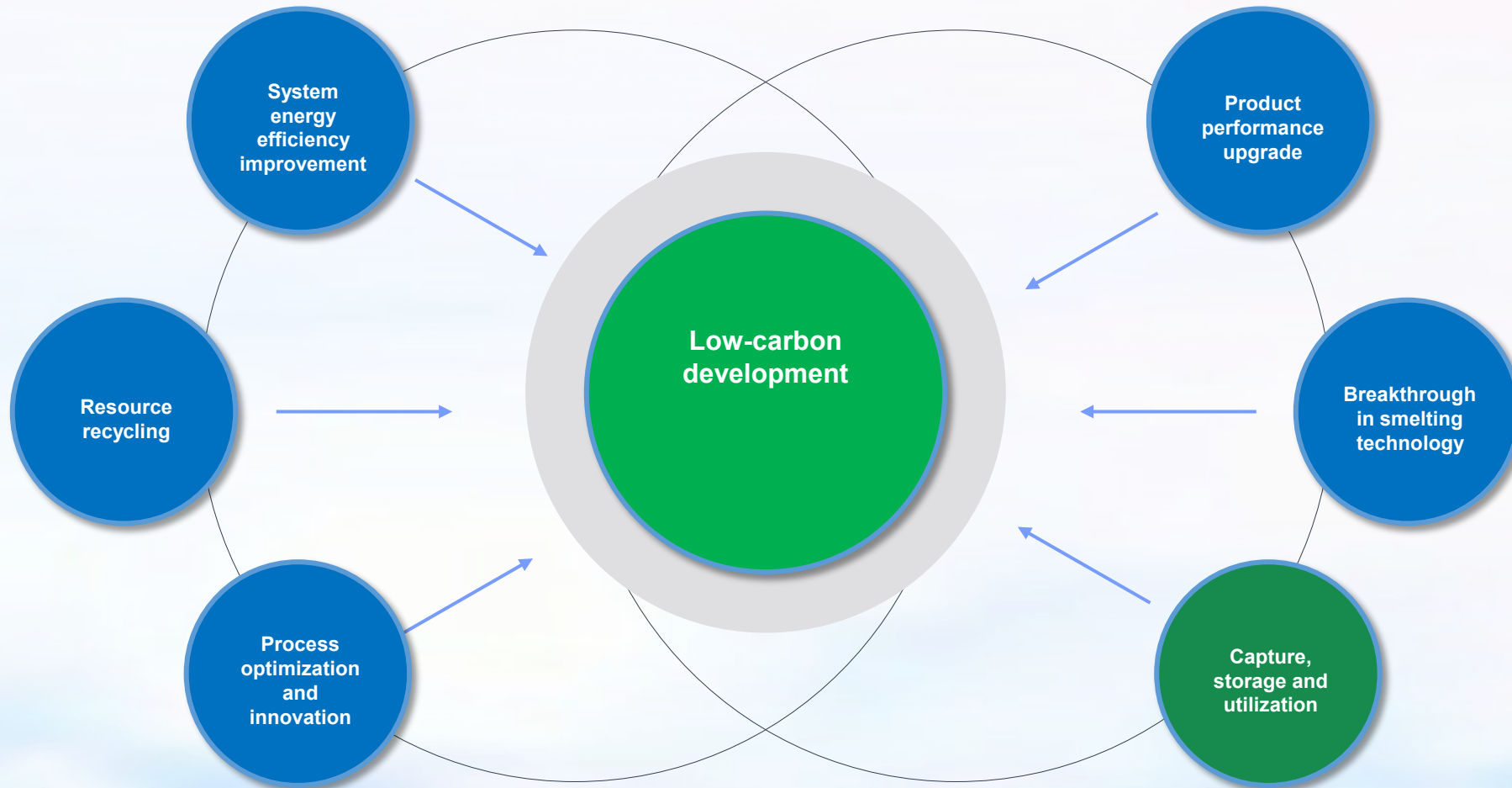
According to assessments by organizations such as the IPCC and IEA, the CO₂ reductions using CCUS technology will continue to increase, and are expected to reach 490 Mt per year by 2030 and 4660 Mt per year by 2050.

- IEA believes that CCUS technology plays an important role in CO₂ emission reduction. If the net-zero emissions are achieved by 2070 in the world, CCUS will be needed as a safety net to retain 15% of CO₂ emissions.
- As IPCC points out, without CCUS, the vast majority of climate models would fail to achieve their goals of mitigating climate change.



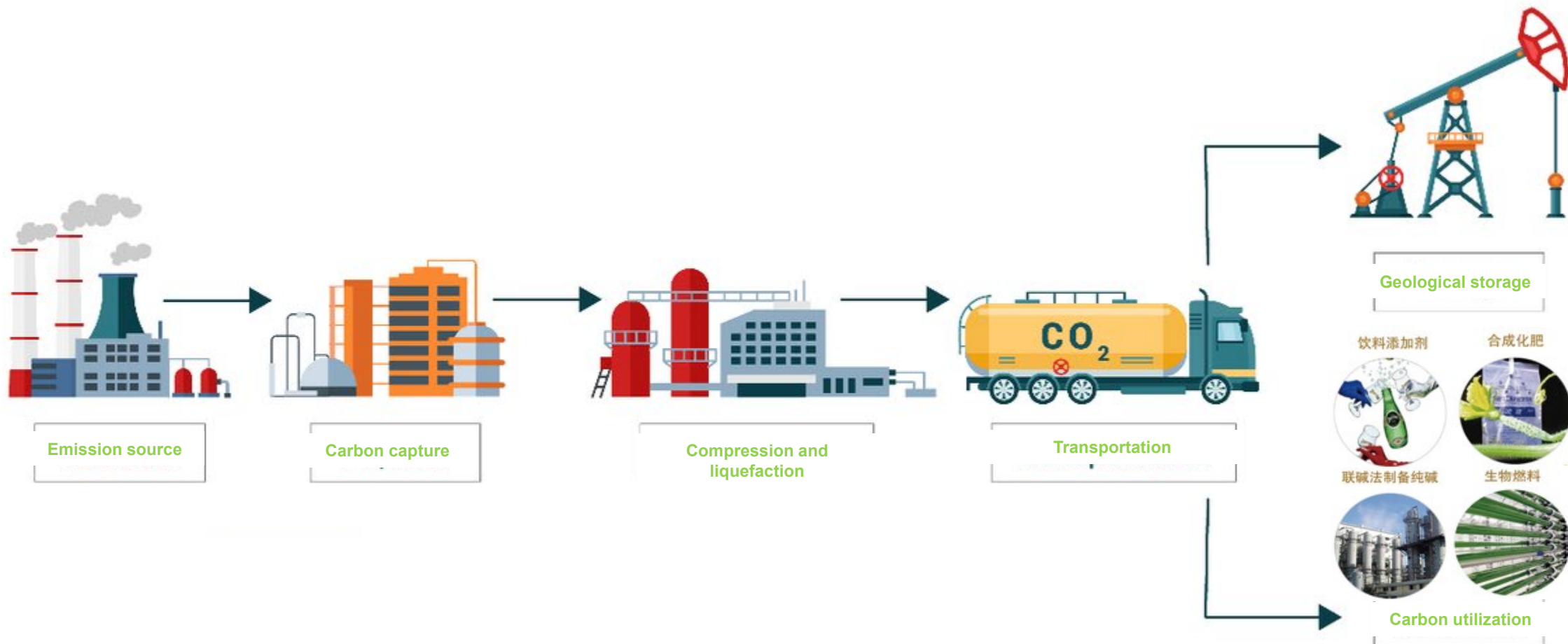
>> CCUS is an Important Pathway to Achieve Carbon Neutrality

- In April 2021, the China Steel Industry Low-Carbon Work Promotion Committee was established, which has raised six major technological paths for low-carbon development.



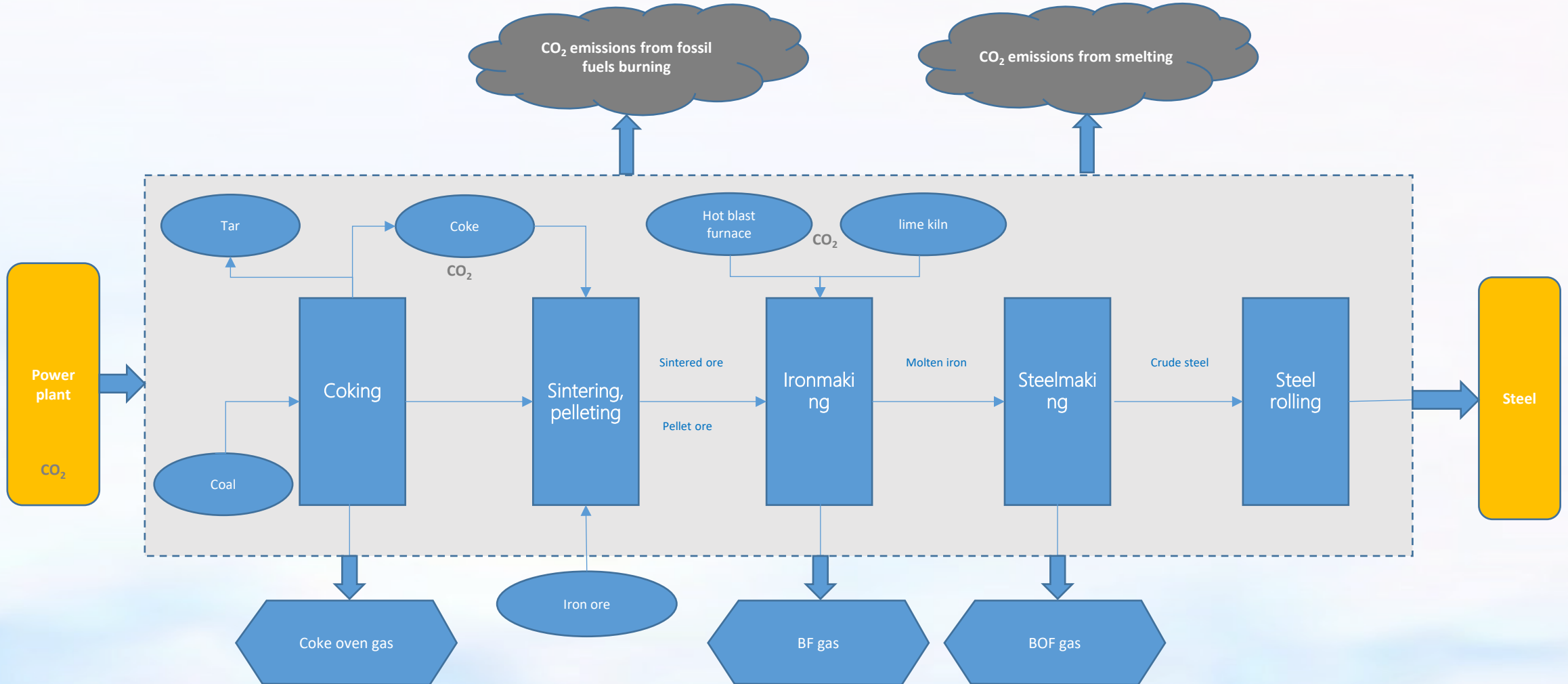
>> CCUS is an Important Pathway to Achieve Carbon Neutrality

- ❑ CCUS: After separated from industrial emission sources (such as electricity, steel and cement sectors), CO₂ is utilized and stored directly or after compression and liquefaction, achieve CO₂ emission reduction.



>> CCUS is an Important Pathway to Achieve Carbon Neutrality

- ❑ The carbon emissions of steel companies are mainly from fossil fuel combustion, smelting, and their own power plants. Among these, the long-process ironmaking process is the most carbon-intensive part of the steel production process, accounting for about 60 to 70% of the total emissions.



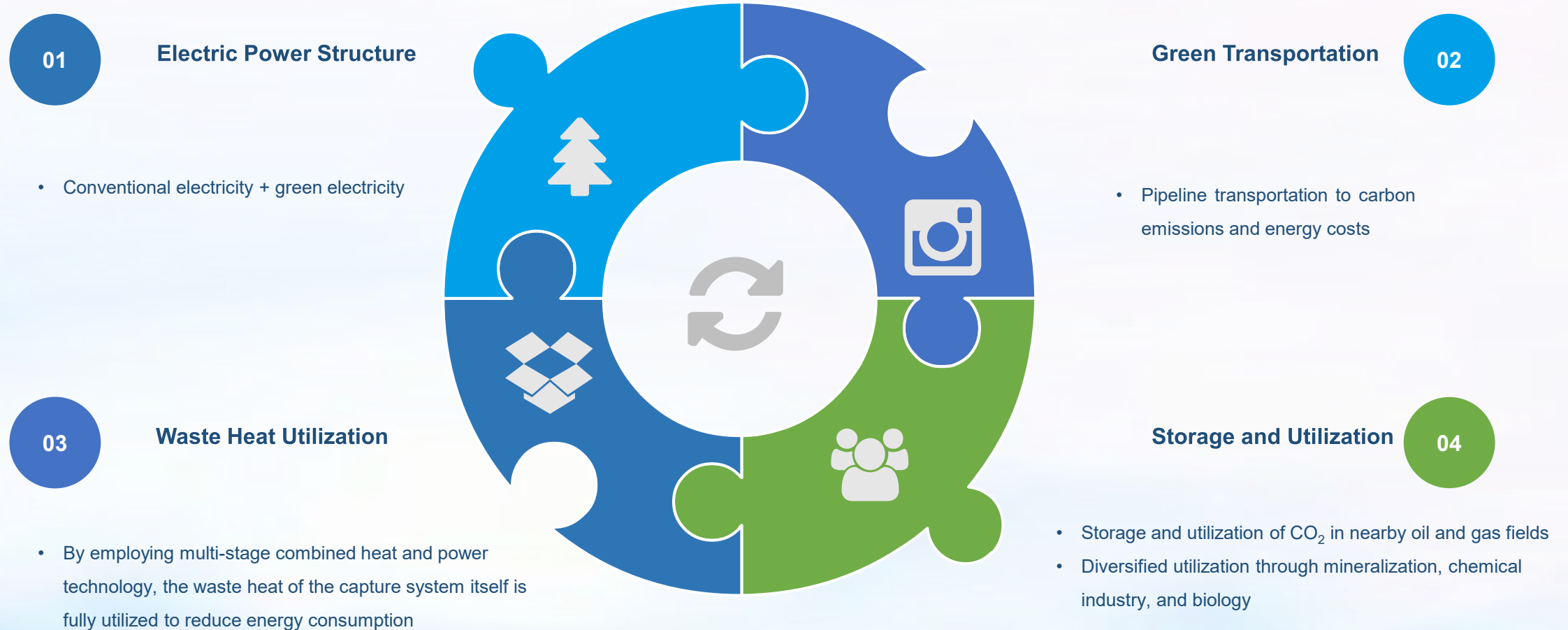
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About CCUS Demonstration Project
(Phase I of 500,000 tons) of Baogang
Group



□ China's first demonstration project regarding Mt-level CCUS carbon neutrality and circular economy in the steel industry





Construction of CCUS Demonstration Project (Phase I) of Baogang Group

- The first phase of the project will have a CO₂ capture and storage capacity of 0.5 Mt per year. After the completion of the second and third phases, the total CO₂ capture and storage capacity will reach 2 Mt per year.



Capture Scale and Investment Plan of CCUS Demonstration Project of Baogang Group

01

Capture Scale

- 0.5 Mt of Phase I
- 1.5 Mt of Phases II and III



02

Investment Plan

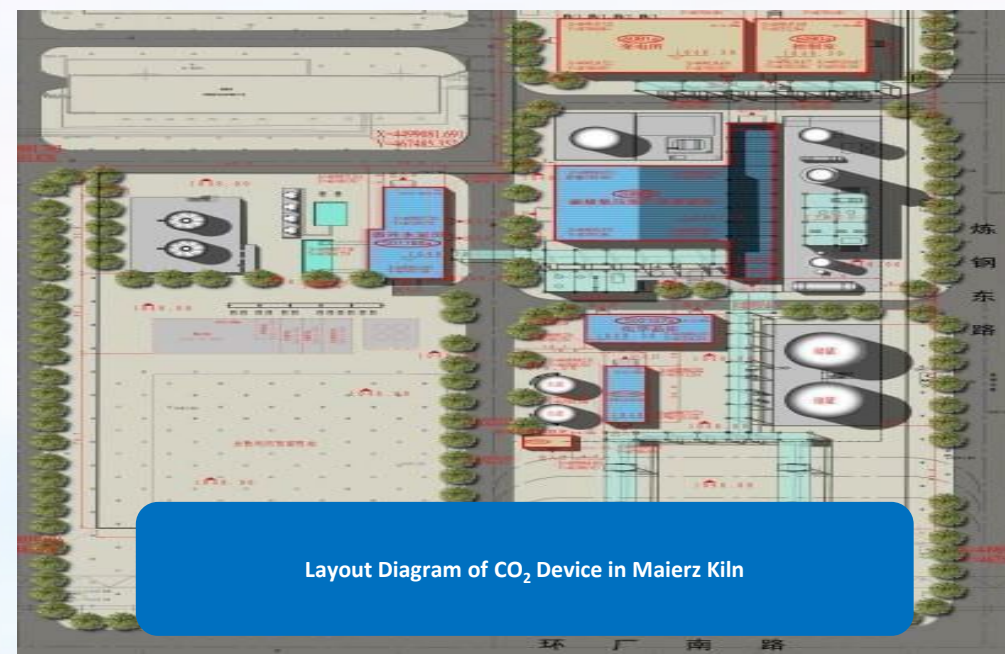
- RMB 600M for Phase I
- RMB 1500M for Phases II and III





Construction of CCUS Demonstration Project (Phase I) of Baogang Group

- ❑ The first phase of the project commenced in March 2023 and was completed at the end of 2024. Phase I consists of the installation of main equipment such as washing towers, absorption towers, regeneration towers, CO₂ tanks, liquid amine storage tanks and CO₂ compressors, as well as the construction of the main steel structure of the factory buildings and other supporting facilities.
- ❑ In June 2025, the full-process integration was successfully achieved in Phase I. Subsequently, we began to gradually identify and eliminate defects, verify system stability and equipment performance. The trial production stage commenced.
- ❑ Since October 2025, we have optimized the operation mode, explored the optimal parameters for the operation of the process, system and equipment, collected trial production data, and measure production costs to accumulate experience for other CCUS projects in the steel industry.



- **Tech Route:** Chemical absorption technology is used to capture CO₂ in the flue gas from combustion in the Maierz Kiln. The captured CO₂ is then compressed and liquefied, and transported to surrounding oil and gas fields by tank truck for fracturing, displacement, huff and puff and other stimulation services. This achieves permanent geological sequestration of CO₂ while generating commercial revenue through increased oil and gas production.
- **Project Scale:** The CO₂ production is 457,600 tons per year, of which the gaseous CO₂ production is 40,000 tons per year and the liquid CO₂ production is 417,600 tons per year. The annual operation is 8,000 hours, and the operation flexibility is 60%~100%.

Specifications of liquid CO₂ products used for oil and gas stimulation

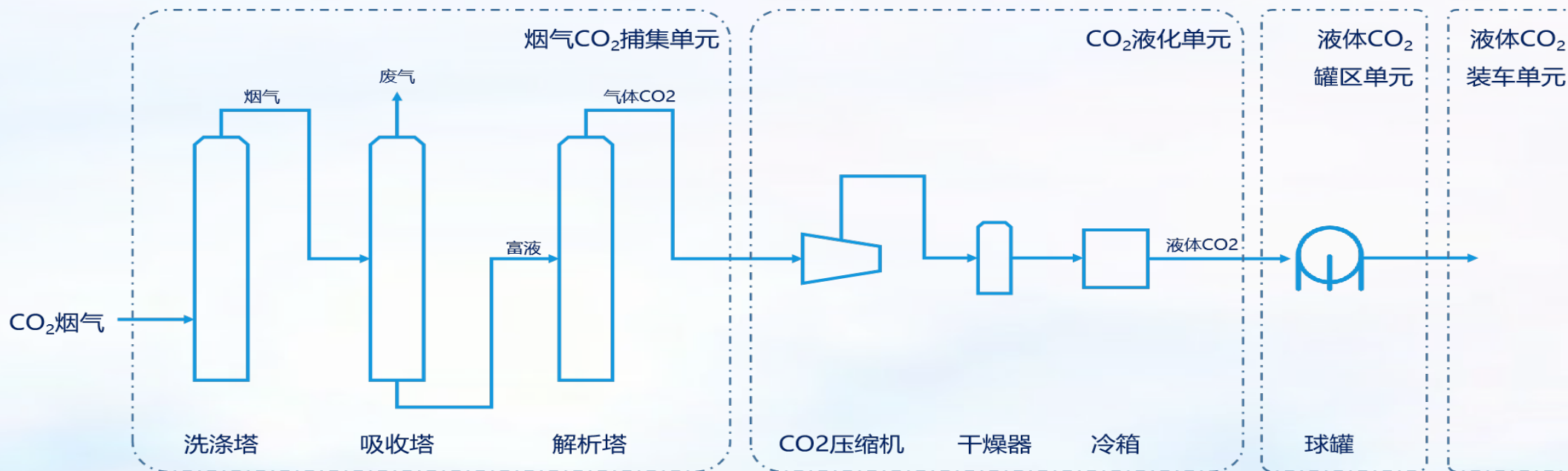
Item	Unit	Index
CO ₂ content	Dry basis, vol%	≥99.9
Water cut	ppmv	≤10

Raw flue gas specifications

Item	Unit	Index
CO ₂	vol%	17.8
H ₂ O	vol%	5.1
CO	mg/Nm ³	<45
Flue gas flow rate	Nm ³ /h	174,289
Temperature	°C	120
Pressure	kPa	-0.03

>> Construction of CCUS Demonstration Project (Phase I) of Baogang Group

- ❑ The composite amine method is used for CO₂ capture, which has high absorption and regeneration characteristics, increasing the net absorption capacity by more than 30%.
- ❑ The process is advanced, including inter-stage cooling, rich liquid diversion and flash compression systems, which can effectively reduce energy consumption. When the capture rate is more than 90%, the energy consumption is less than 2.4 GJ/t CO₂.
- ❑ The absorbent is stable chemically and thermally, is not easily degraded and has a low escape rate. Its service life is extended by 50%, reducing absorbent consumption and operating costs. It also has low corrosivity, extending the service life of related equipment.



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Prospect for Diversified Application of CCUS Demonstration Project of Baogang Group

>> Prospect for Diversified Applications of Baogang CCUS Demonstration Project (Phase I)

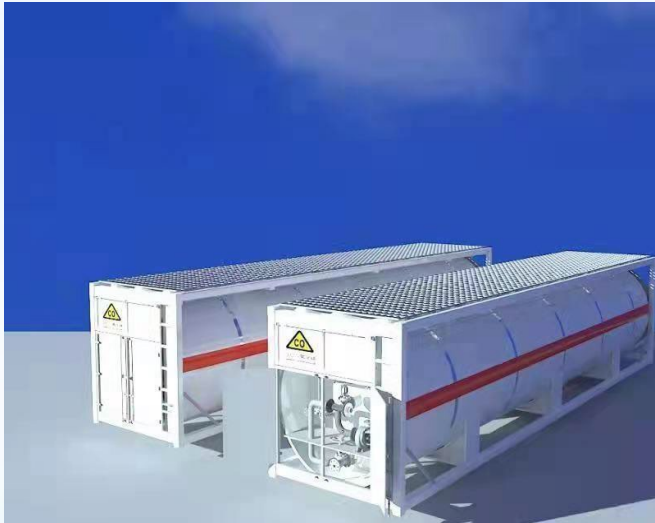
- With the advancement of global carbon neutrality goals, enhanced policy support, and breakthroughs in cutting-edge technologies, the Baogang CCUS demonstration project will gradually witness the expansion of its application scenarios, providing a Baogang solution to promote the industrialization of CCUS in and accelerate the decarbonization of the steel industry.





Prospect for Diversified Applications of Baogang CCUS Demonstration Project - Geological Utilization

- ❑ The supporting CO₂ storage and utilization technologies employed by the Project include CO₂ fracturing and oil driving, which sequesters CO₂ to deep formations on a large scale, while increasing the production and efficiency of oil and gas fields.
- ❑ The dedicated CO₂ booster pump comes with a multi-stage sealing design, which increases the pumping efficiency and discharge volume of liquid CO₂. The CO₂ loss rate is much lower than that of similar products at home and abroad. The new CO₂ box-type booster tank has a gasification booster process to ensure injection efficiency, so that there is basically no residual CO₂ in the tank. The liquid level changes in the tank is being monitored constantly. Also remote control is used to reduce operational risks.



New CO₂ Box-type Booster Tank



Booster Pump skid

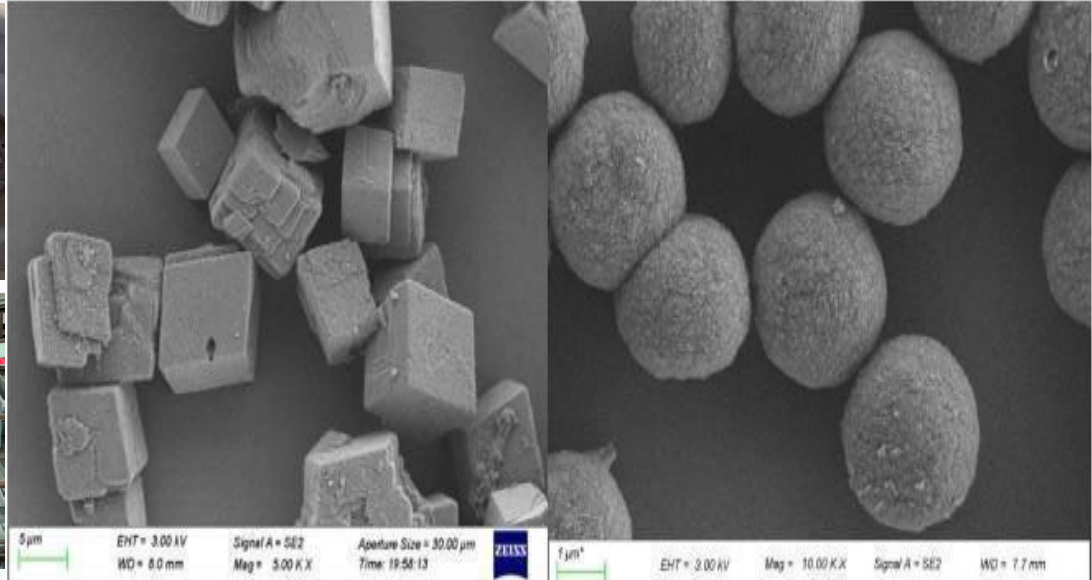
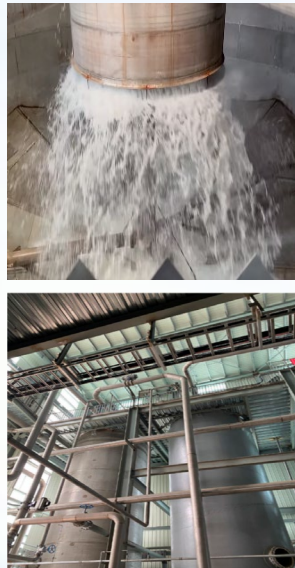


Instrument Skid



Prospect for Diversified Applications of Baogang CCUS Demonstration Project - Mineralized Utilization

- ❑ Baogang Group has completed the world's first industrial demonstration project for two-step indirect mineralization of steel slag. Through integrated treatment of steel slag, high-purity calcium carbonate and iron-containing materials are finally formed. The products can be used in multiple sectors such as papermaking, plastics, coatings, and rubber.
- ❑ Compared with traditional high-purity calcium carbonate production technology, the carbonization method for treating steel slag used in this project eliminates the roasting process, which reduces CO₂ emissions. Moreover, CO₂ is used directly as a raw material to participate in the reaction, achieving a dual carbon reduction effect. According to measurements, about 0.3 tons of CO₂ can be carbonated and sequestered using 1 ton of steel slag.





Prospect for Diversified Applications of Baogang CCUS Demonstration Project - Chemical Utilization

- ❑ A CO₂-to-ammonium bicarbonate production project (of 200,000 tons per year) has been planned, in order to extend the internal circulation over the carbon industry chain, conserve energies, reduce emissions and create more economic value.
- ❑ The project is expected to consume 110,000 tons of CO₂ annually. The feasibility study has been completed and the project has been approved.





Prospect for Diversified Applications of Baogang CCUS Demonstration Project - Biological Utilization

- Baogang Group, in conjunction with the Baotou Municipal Bureau of Agriculture and Animal Husbandry and the Institute of Agricultural and Animal Husbandry Science and Technology, conducted a CO₂ gas fertilizer utilization project at the National Modern Agricultural Demonstration Base in Jiuyuan District. For two harvests a year, each mu of crops can absorb about 2 tons of CO₂.
- Currently, the area under CO₂ gas fertilizer application in Baotou City exceeds 10,000 mu, of which: Five CO₂ storage tanks were built in different locations, radiating an area of 7,400 mu of surrounding farmland and facilities;
- Tests showed that within one production cycle, tomatoes fertilized with CO₂ gas fertilizer increased 18.23% in weight per fruit and 20.13% in total yield.





Although the Baogang CCUS demonstration project (Phase I) has been successfully put into production, there remain many challenges ahead in moving from demonstration to full commercialization and large-scale operation. In the future, Baogang Group will continue to work hard to overcome difficulties, accumulate data, verify technologies, solve problems and reduce costs, striving to improve both environmental and economic benefits.

Thank You!



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