

# Status & Trends of CCUS in China

The 3rd CCUS & Hydrogen International Symposium

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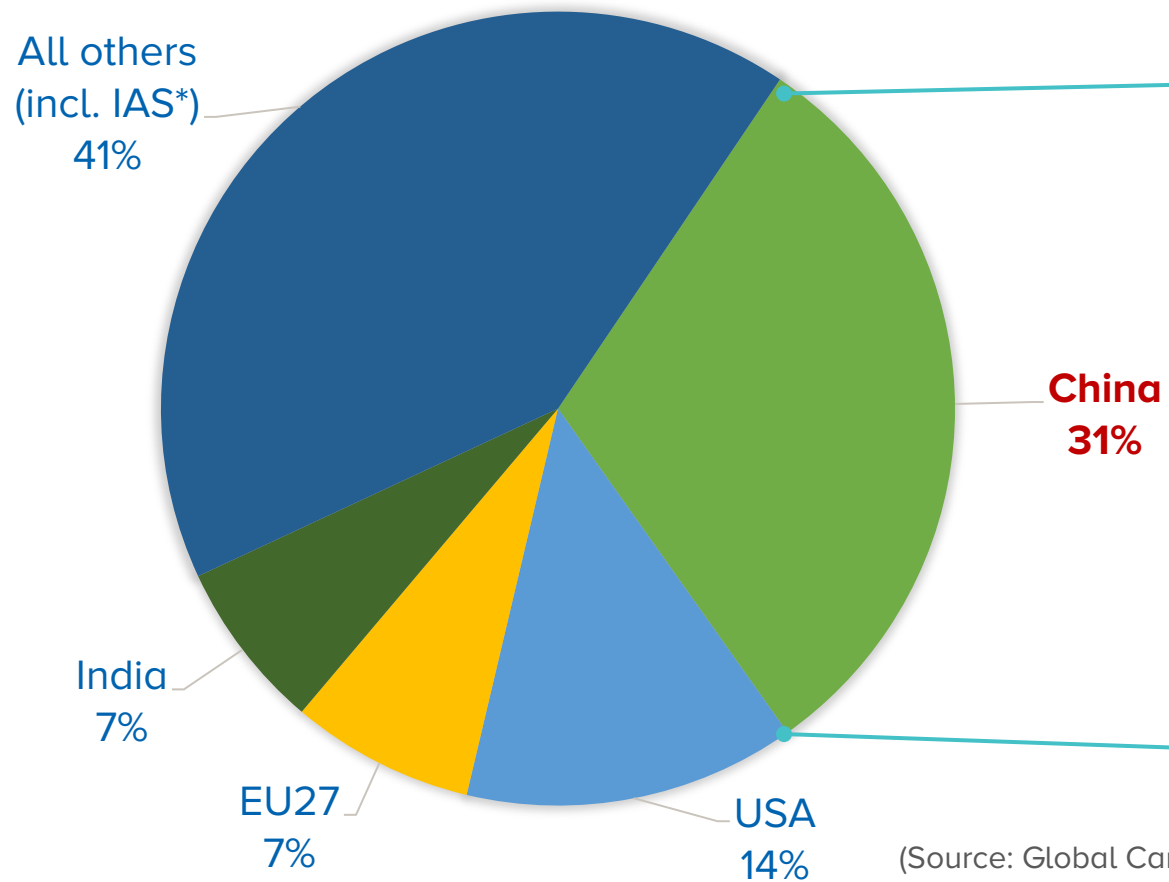
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# KEY MESSAGES

- It is scientifically and politically agreed that CCUS will play a critical role in China's carbon neutrality target.
- A great momentum is happening, driven by the State-Owned-Energy Enterprises, since the beginning of 2021.
- More specific policy incentives and a legal & regulatory framework are required for the next phase of CCUS development in China.
- International collaboration in CCUS are very much welcomed in China.

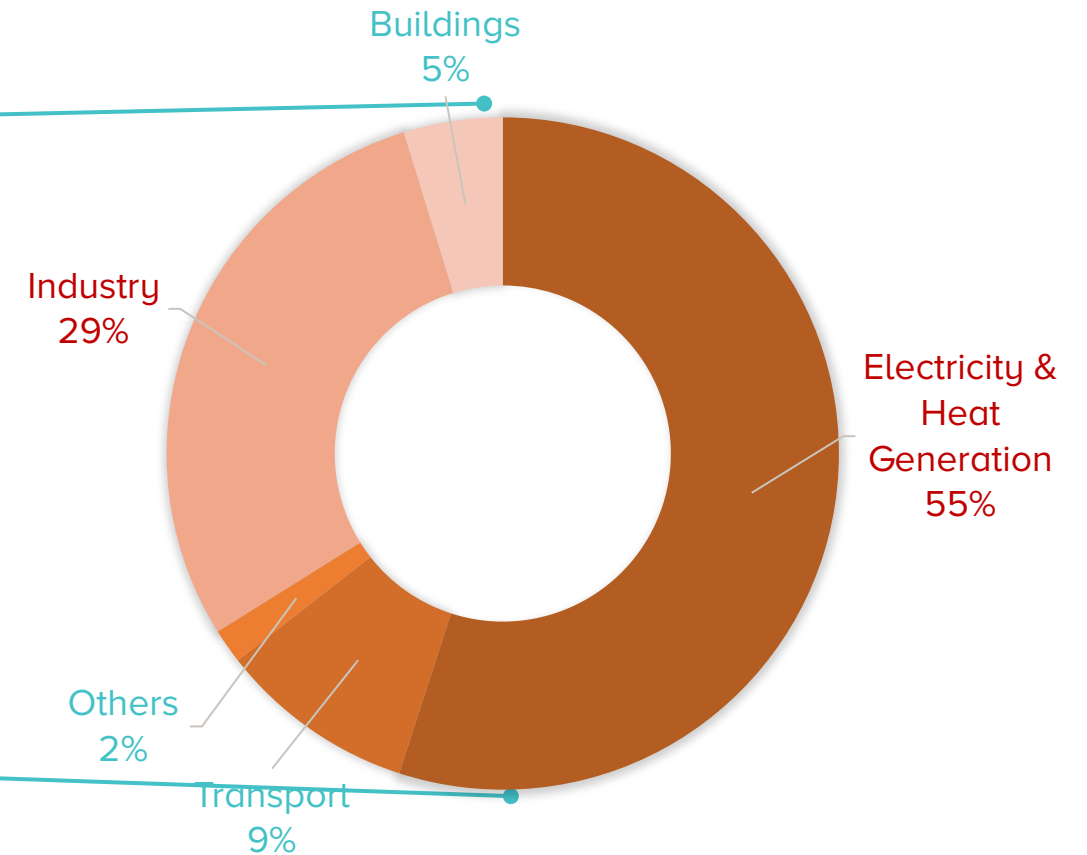
# SCIENCE - CCUS IS ESSENTIAL

## GLOBAL FOSSIL CO<sub>2</sub> EMISSIONS IN 2020



(Source: Global Carbon Budget, 2021)

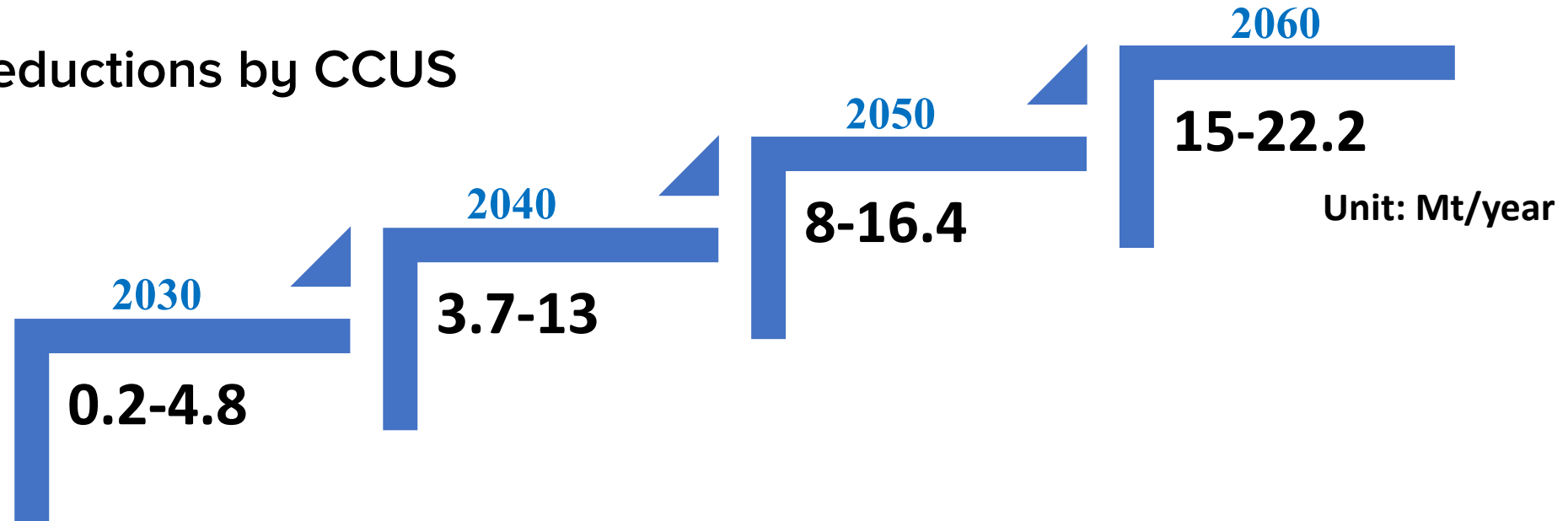
## CHINA'S FOSSIL CO<sub>2</sub> EMISSIONS BY SECTORS IN 2019



(Source: IEA, 2021)

# SCIENCE - THE ROLE OF CCUS

- CO<sub>2</sub> Reductions by CCUS



- Key Applications

Coal Power

Iron & Steel

Petrochemical

Coal-chemical

Cement

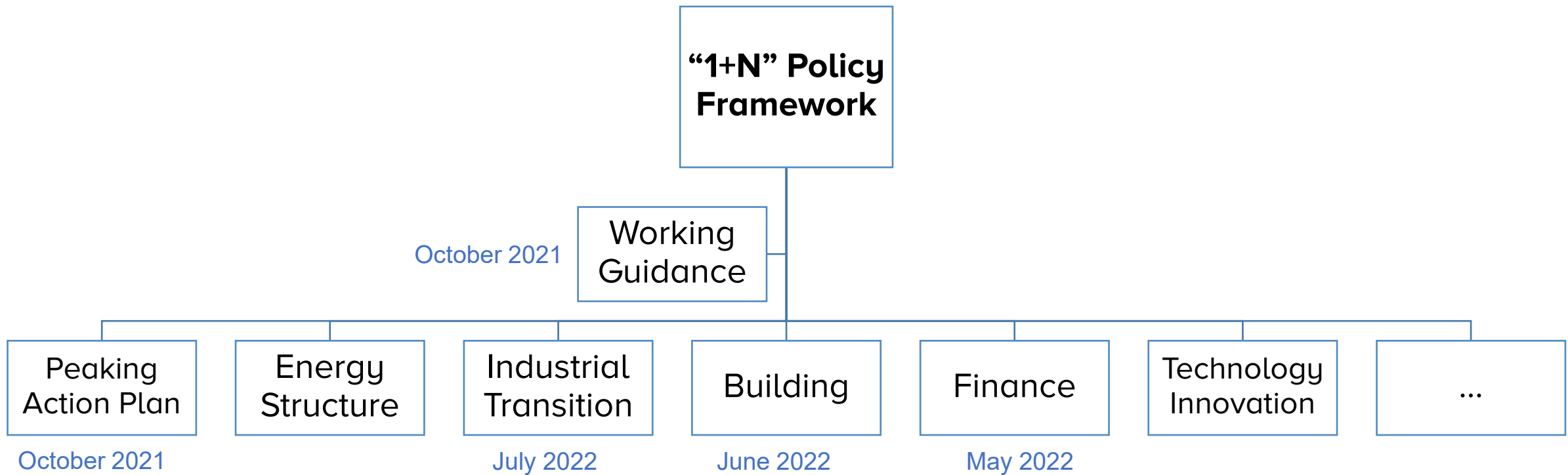
BECCS

DACCS

(Source: Status of CO<sub>2</sub> Capture, Utilization and Storage in China 2021 — A pathways study)

# POLICY - TURNING COMMITMENT INTO ACTIONS

- “aim to have CO2 emissions peak before 2030 and achieve carbon neutrality before 2060”



# POLICY - KEY 2030 CLIMATE TARGETS

Indicators	2030 Targets	Progress (2021)
Peaking CO2 emissions	“Before 2030” (and “achieve carbon neutrality before 2060”)	
CO2 intensity reduction (compared to 2005)	>65%	50.3%
Non-fossil share in primary energy mix	Around 25%	16.6%
Forest stock volume increase (compared to 2005)	6bn cubic metres	
Installed capacity of wind and solar power	> 1,200GW	635GW

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# POLICY – CCUS-RELATED

- CCUS was included in the country's "1+N" climate policy system, demonstrating the highest commitment to this decarbonization solution.
- Integrated Industrial-scale CCUS demonstration will be supported in the next 5-10 years.

## National ETS

Start of operation: 2021

GHGs covered: CO<sub>2</sub>

Sectoral coverage: Power

Allocation: Free Allocation

Cap: 4.5GtCO<sub>2</sub> (40% of China's total)

Offset and credits: Domestic 5%

CCUS is not included in the ETS yet.

## Carbon Emission Reduction Facility

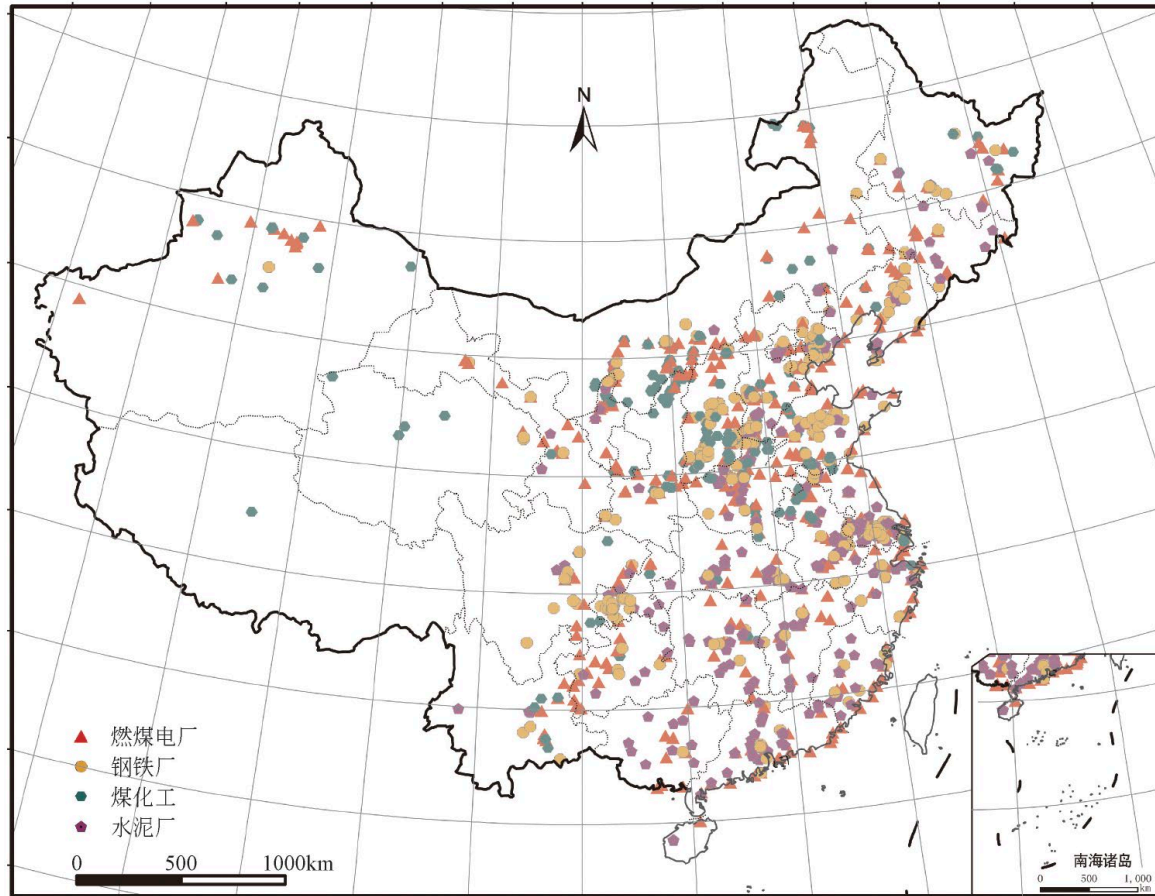
People's Bank of China

Start of operation: Nov 2021

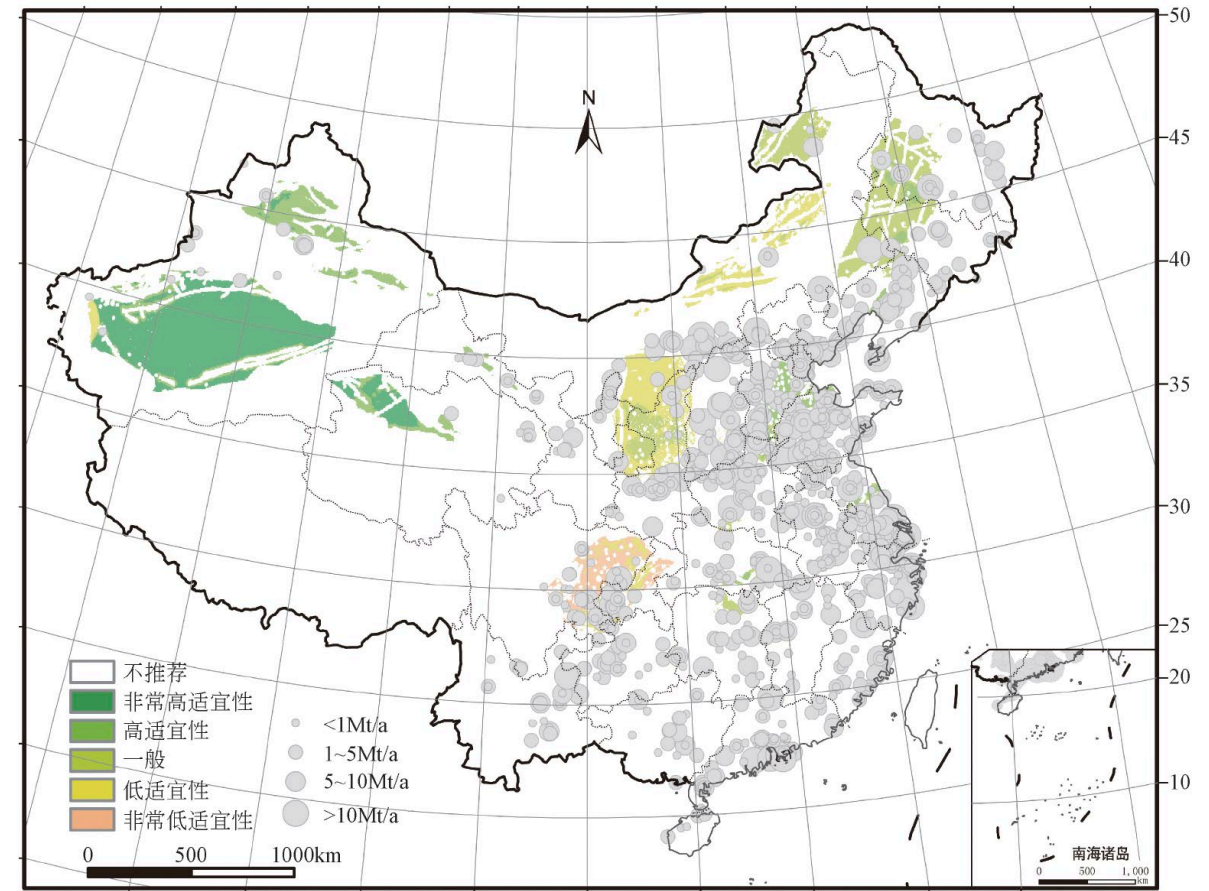
PBOC provides low-cost funds to financial institutions and guide the financial institutions to extend carbon reduction loans at rates close to the loan prime rate of the same maturity.

CCUS is included.

# SOURCE-SINK MATCHING



Emitters Distribution



Storage Potential

(Source: ACCA21, 2022)



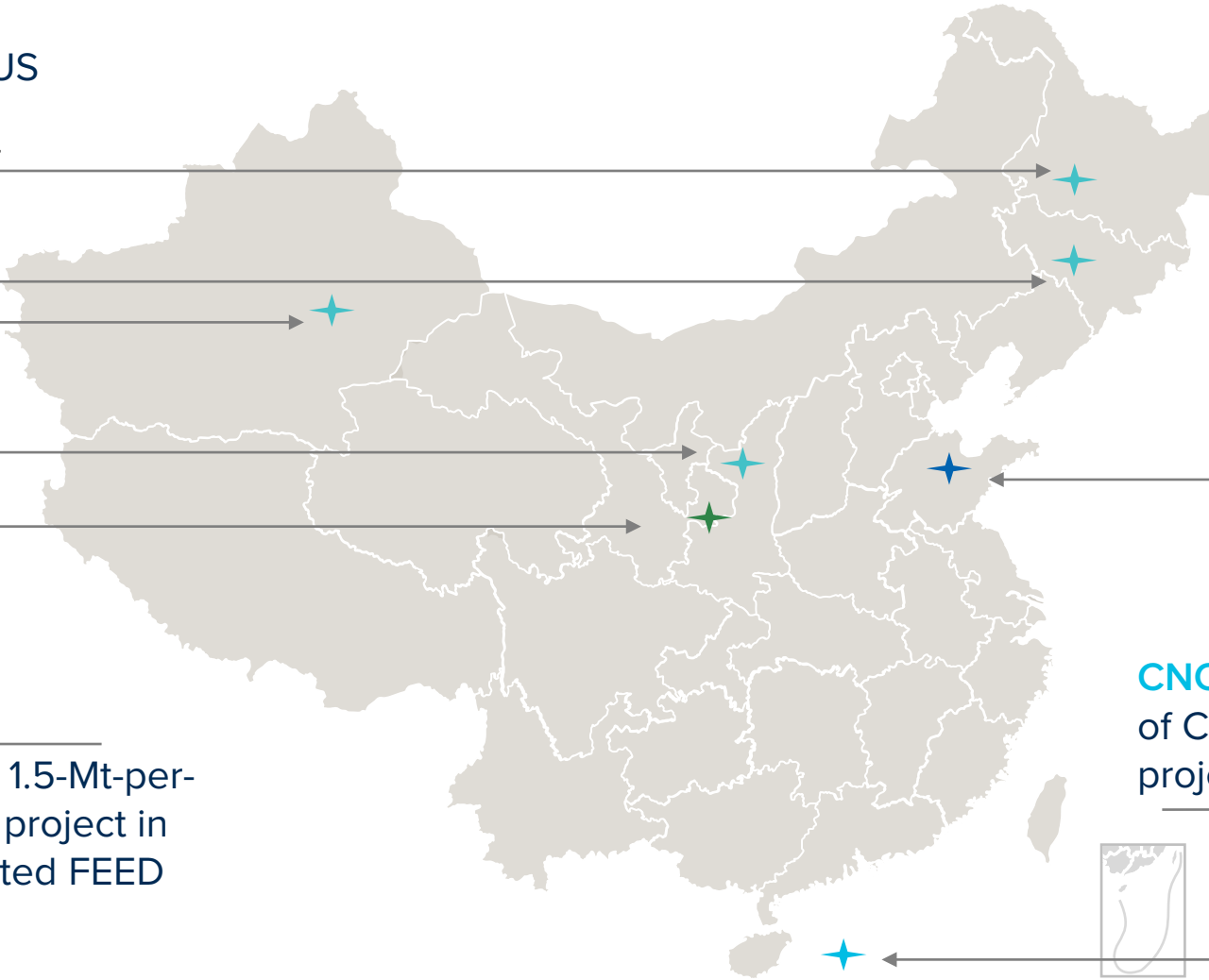
# PROJECTS ANNOUNCED SINCE 2021

**CNPC** announced 4 one-Mt-scale-per-year integrated CCUS projects in March, 2022.

**SINOPEC** has completed the construction of China's first 1-Mt-per-year CO<sub>2</sub> capture facility in Feb, 2022.

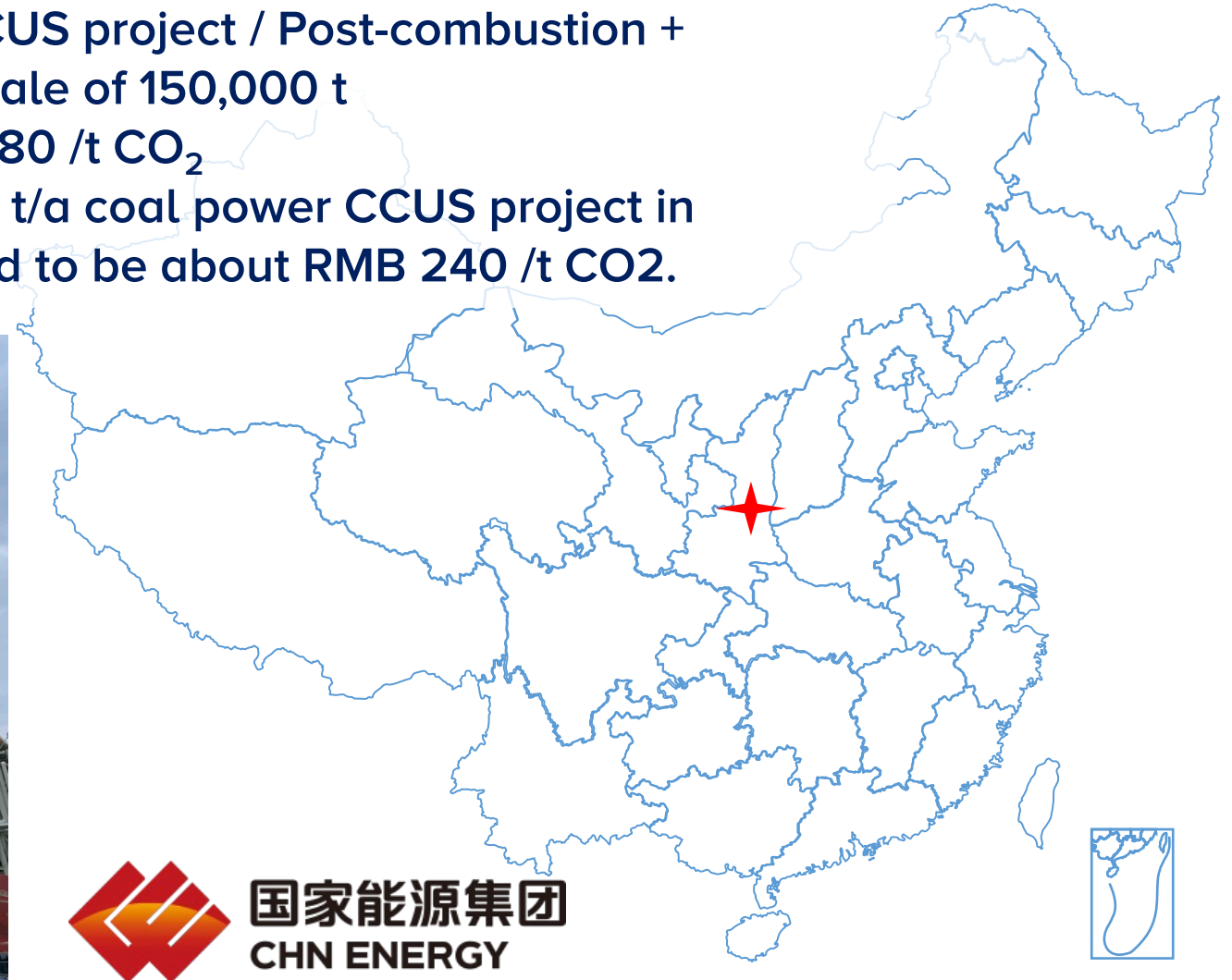
**CNOOC** completed the construction of China's first offshore CO<sub>2</sub> storage project in June 2022.

**Huaneng** announced a 1.5-Mt-per-year coal power CCUS project in Gansu. The project started FEED in March 2022.



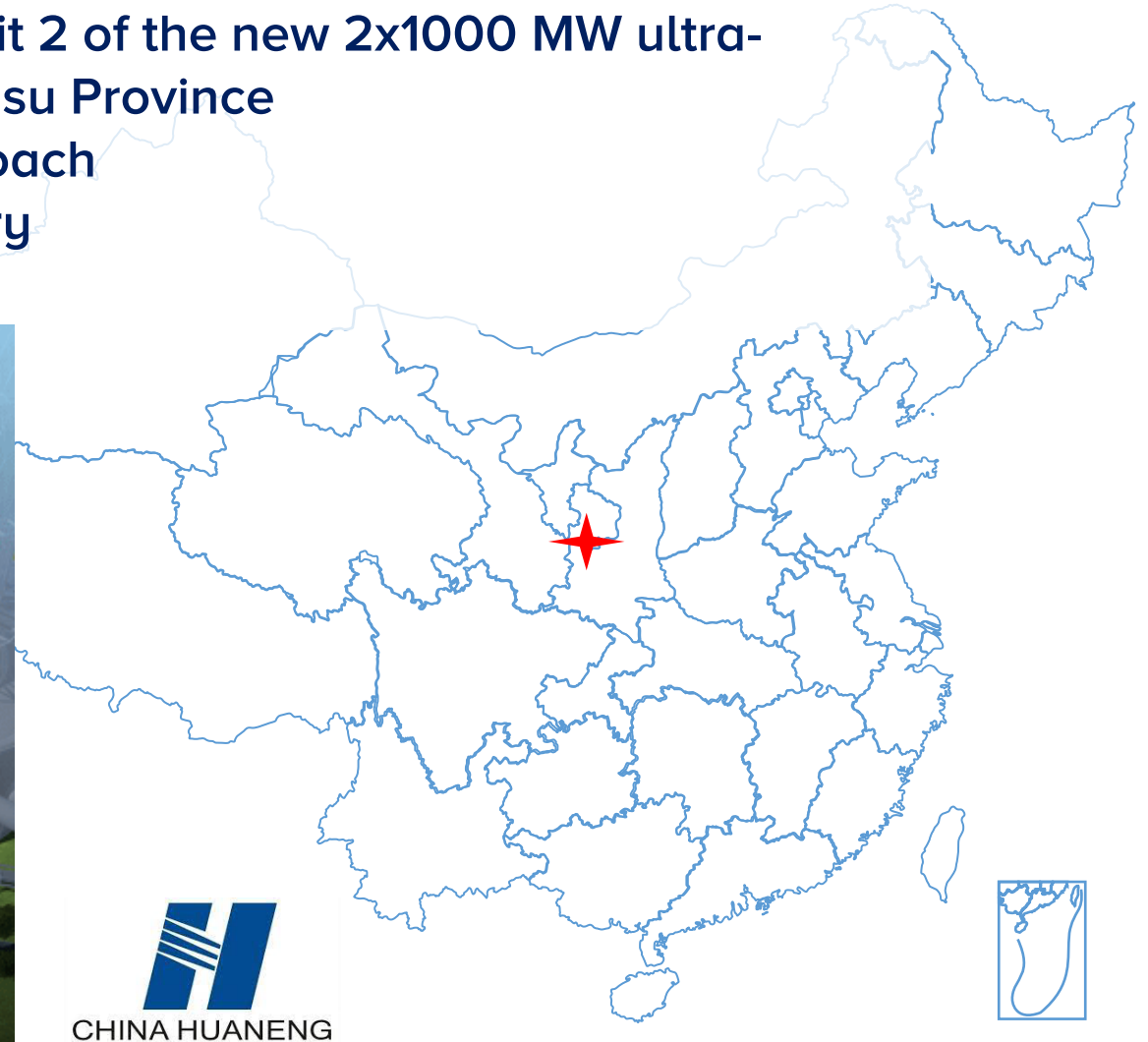
# PROJECT – NATIONAL ENERGY INVESTMENT

- The largest operational coal power CCUS project / Post-combustion + chemical absorption with an annual scale of 150,000 t
- Current capture operating cost: RMB 280 /t CO<sub>2</sub>
- China Energy is developing a 500,000 t/a coal power CCUS project in Jiangsu. The operating cost is expected to be about RMB 240 /t CO<sub>2</sub>.



# PROJECT – HUANENG

- 1.5 million tons of CO<sub>2</sub> per year from the Unit 2 of the new 2x1000 MW ultra-supercritical coal-fired power station in Gansu Province
- Post-combustion chemical absorption approach
- Geological storage & Enhanced Oil Recovery
- Expected to be fully operation in 12/2023





# PROJECT – SINOPEC

- 1 million tons of CO<sub>2</sub> per year from SINOPEC Qilu Petrochemical Plant
- Transported by trucks to an oil field for recovery (80km)
- The construction of the capture facility was completed in 01/2022



(Source: China Energy Engineering Corporation)



**SINOPEC**

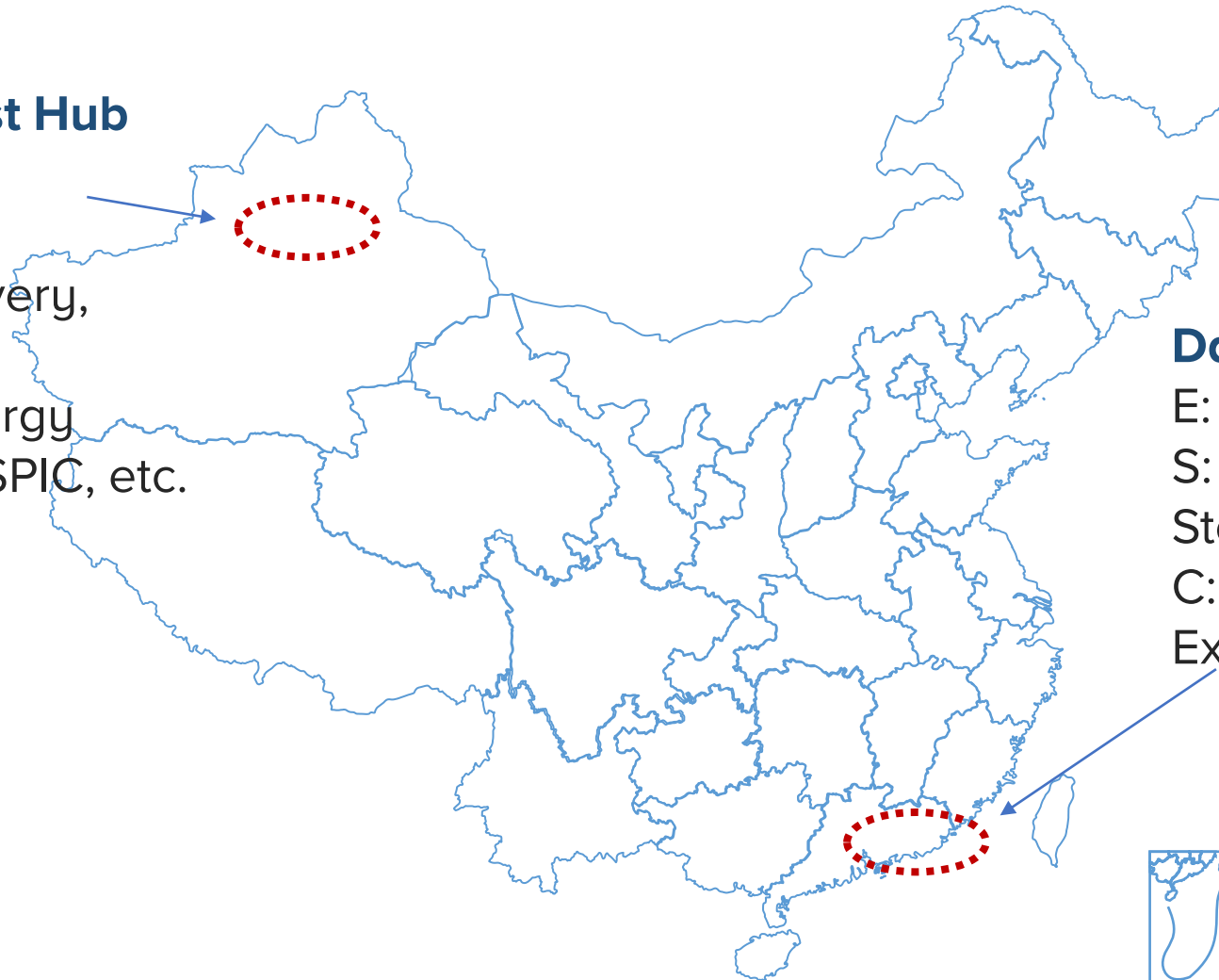
# HUBS TO WATCH

## OGCI China Northwest Hub

E: Coal power, coal-to-chemicals, cement...

S: Enhanced-Oil-Recovery, Storage

C: CNPC, National Energy Investment, Huadian, SPIC, etc.



## Dayawan Offshore Hub

E: Petrochemicals

S: Offshore Geological Storage

C: CNOOC, SHELL, ExxonMobil

E: Emitters  
S: Storage  
C: Company  
P: Project

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# CAPTURE TECHNOLOGY STATUS

- Current Capture Costs in China (including compression): **120-480 RMB/t**
- Capture Costs Predication in 2030 in China: **90-390 RMB/t**

Capture Technology	Status
Chemical absorption method	In the industrial demonstration stage, there is no million-ton demonstration project
Adsorption method	Pilot demonstration stage
Membrane method	Laboratory development stage
Oxygen-enriched combustion	Pilot demonstration stage
Chemical chain combustion	Laboratory research and development or small-scale test stage

(Source: Zhang, et al., 2022)

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# WHAT IS NEEDED NEXT?

- Define the role of CCUS in China's middle- and long-term climate strategies.
  - Develop more specific policy incentives to create a sustainable business model for CCUS.
  - Develop CCUS laws and regulations that are recognized internationally.
  - Governments need to support the establishment of transport and storage infrastructure.
  - Encourage technology innovation and support RD&D programs.
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# Thank you

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