Incentivizing CCS Deployment in China

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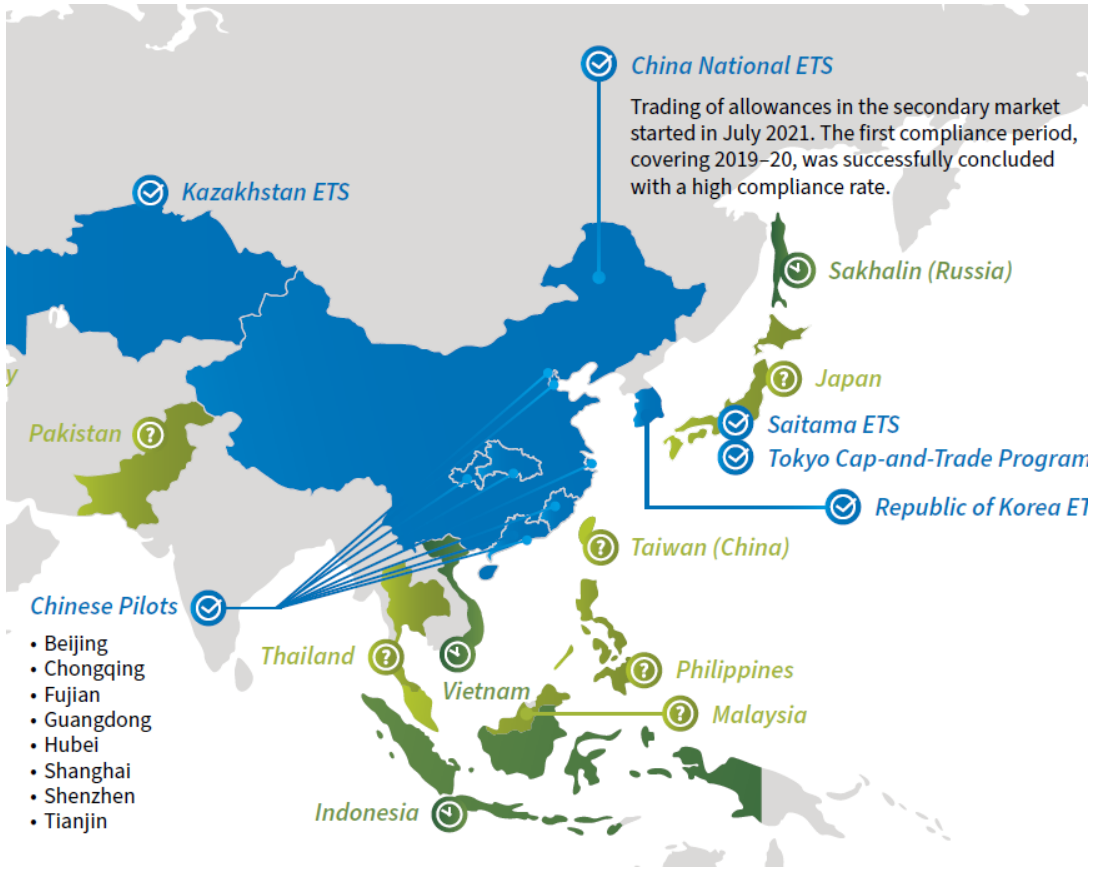
CLIMATE POLICY LAB

Outline

- **ETS, Carbon Prices, and Power Sector**
- Carbon Prices and CCS Deployment
- China's CCUS Policy Inventory
- Hurdles of CCUS Deployment

Emissions Trading System



Source: ICAP

China's National ETS

- The world's largest in terms of covered emissions, one-seventh of global CO2 emissions from fossil-fuel combustion
- Start of operation: *2021*
- Sectoral coverage: *Power*
- Allocation: *Free Allocation* (Benchmarking)
- Cap: *~4,500 MtCO2 (2019 and 2020)*

Carbon Prices

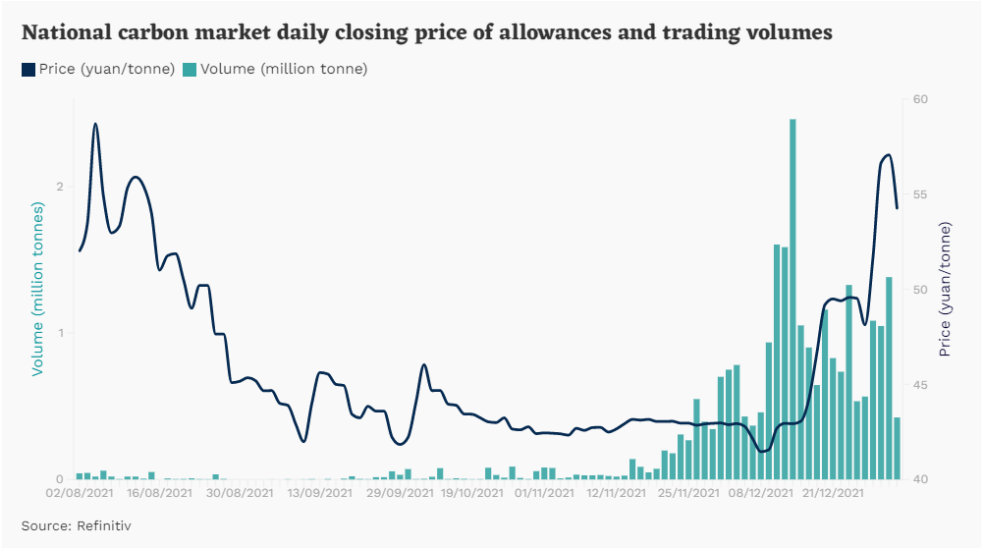
- *Including both listed and off–exchange trades, the weighted average price of allowances in 2021 was 43.85 yuan ($6.89) per tonne*

Carbon emissions allowance trades in the main segments of China's carbon market, 2021

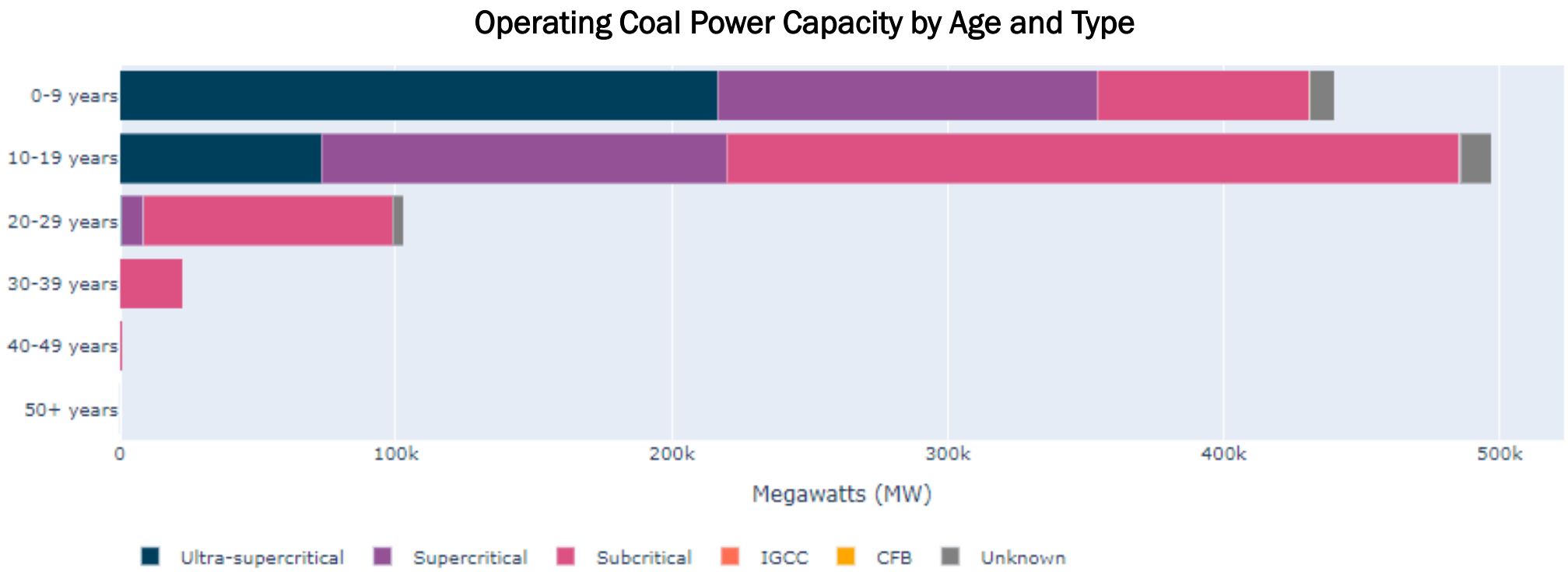
	Trade volume (million tonnes)	Value (million $)
National ETS	178.79	1,301.23
Regional pilots	63.58	371.05
CCERs	169.68	N/A
Total	412.05*	1,672.83

Note: *Total volume includes allowances transacted in pilot ETS, national ETS and CCER transactions. Value includes only allowance units (as CCERs are mainly traded over-the-counter, there is no publicly available source for prices). Transactions of local offset units in the separate pilots are small, and not included in our assessment.

Source: China Dialogue

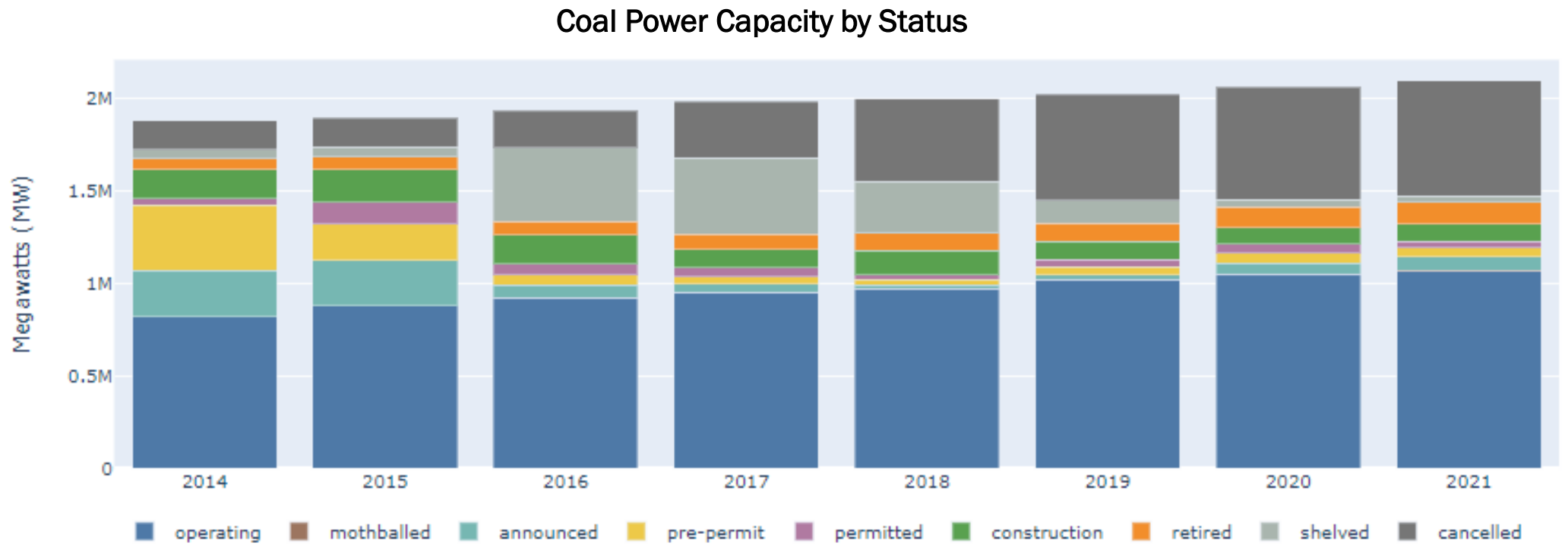


Power Sector



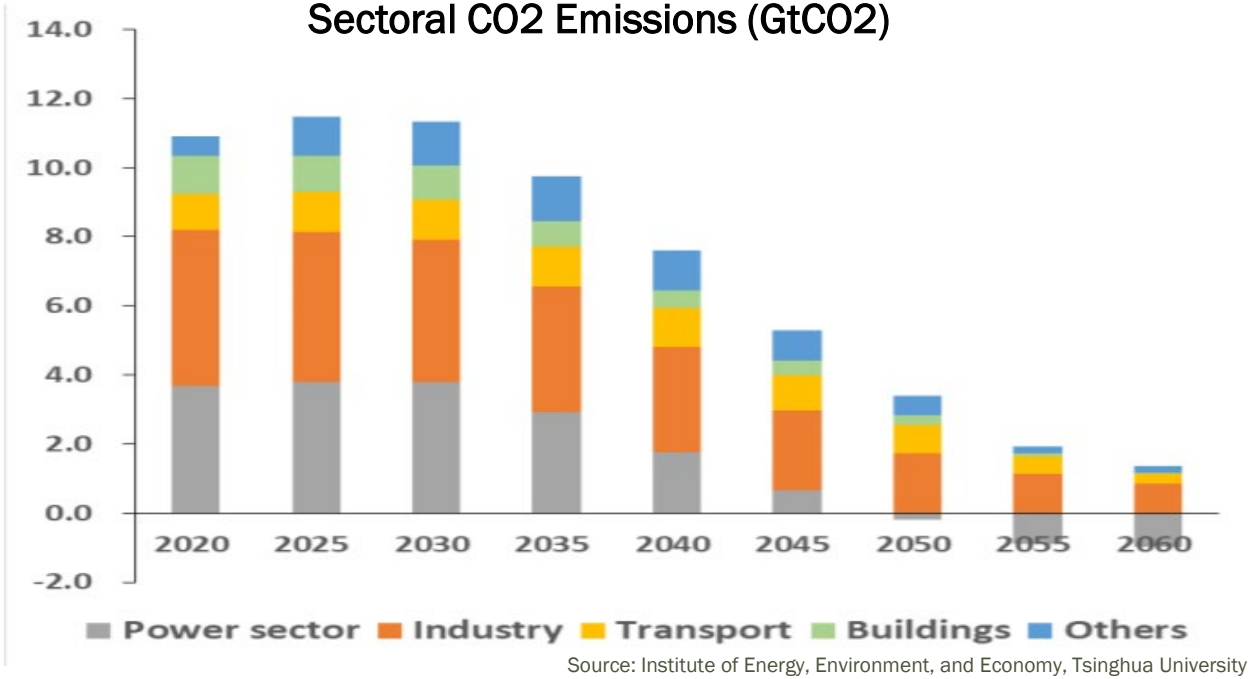
Source: Global Energy Monitor

Power Sector



Source: Global Energy Monitor

Power Sector



Source: Institute of Energy, Environment, and Economy, Tsinghua University

"It is largely a renewable energy-nuclear-CCS dominated transformation pathway without considering DAC " - Prof. Zhang Xiliang

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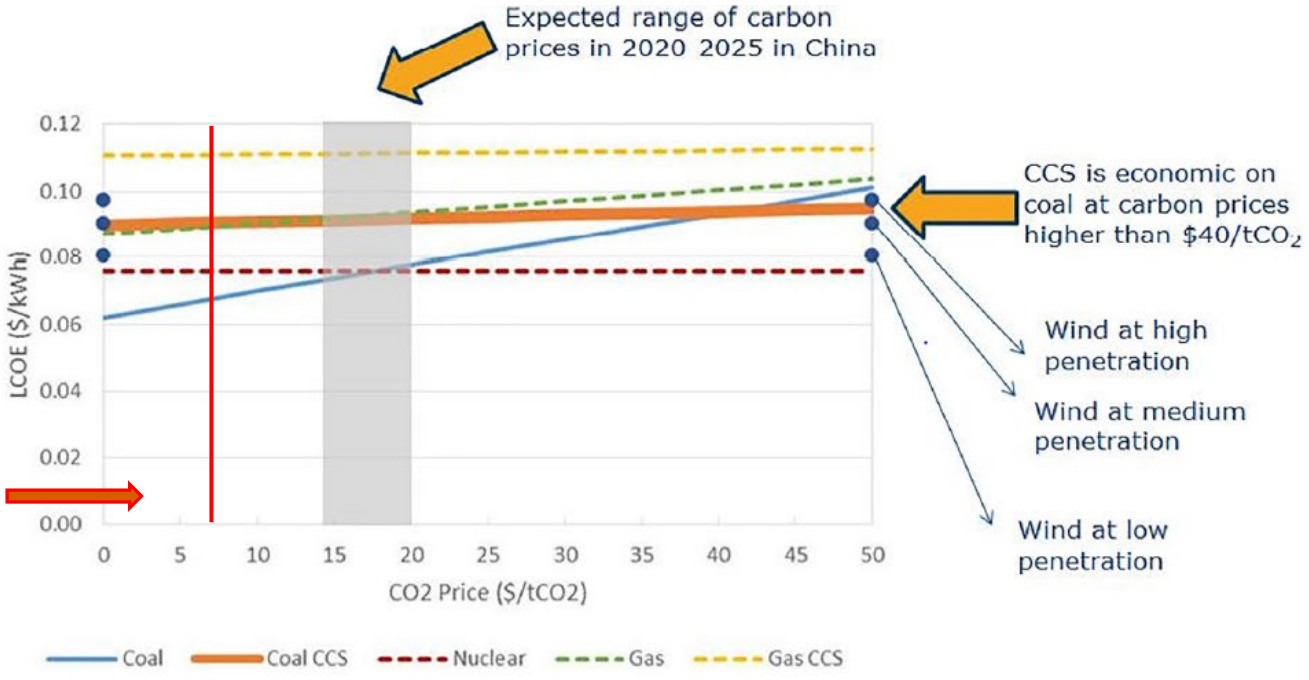
Carbon Prices and CCS Deployment

Cost of Producing Electricity with Coal Price of 1.59 $/MMBTU and Natural Gas Price of 7.34 $/MMBTU



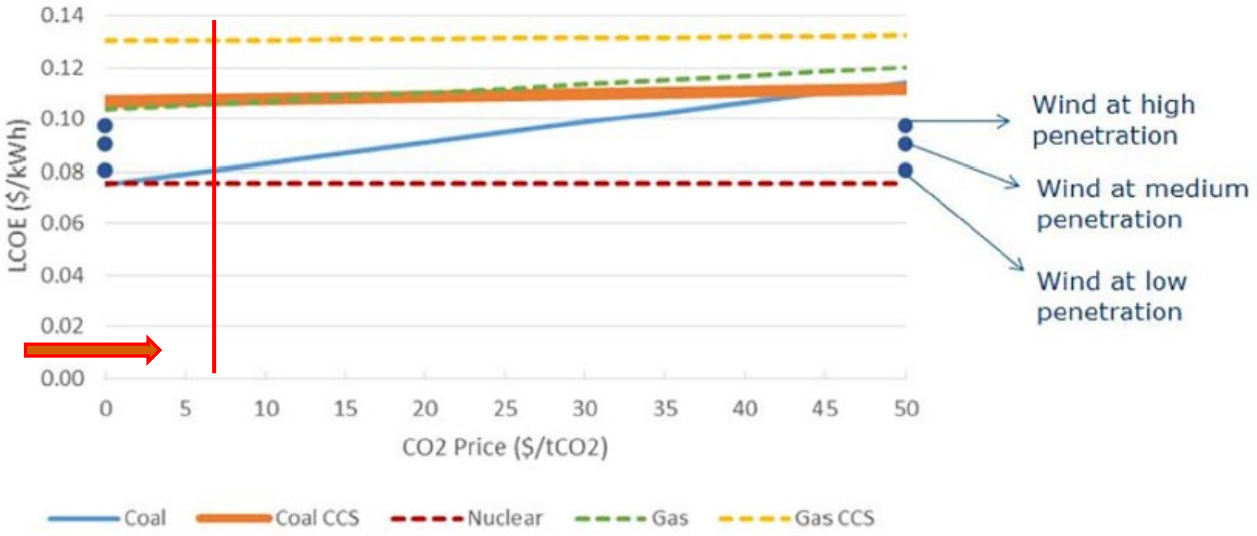
Source: J. Morris et al./Energy Economics (2019)

- 30 – 40 $/tco2 make CCS technologies on coal-based generation cost-competitive
- > 100 $/tco2 favor a major expansion of CCS

Carbon Prices and CCS Deployment

Sensitivity Analysis
Coal Price = $3.2/MMBTU; Gas Price = $10/MMBTU

2021 Average Carbon Price



Source: J. Morris et al./Energy Economics (2019)

Other estimates

- > 350 yuan/tco2 prefer CCS retrofitting (Zhang et al., 2014)
- Critical carbon prices for CCS investment at 103.56 yuan/tco2 with 100% subsidy and 217.95 yuan/tco2 without subsidy (Wang and Du, 2016)

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CCUS Policy Inventory (Selected policies)

Year	Ministry	Policy	Impact
2006	State Council	National Medium- and Long-Term Program for Science and Technology Development (2006 - 2020)	CCUS RD&D started
2007	Ministry of Technology and NDRC	China's Special Action on Climate Change Science and Technology	CCUS was listed as core technology
2007	Ministry of Technology	China CCUS Technology Development Roadmap	Comprehensive CCUS development plan
2011	State Council	12th FYP on Science and Technology Development	Rapid development of CCUS
2012	Ministry of Technology	12th FYP Special Plan for Science and Technology Development	Rapid development of CCUS
2013	NDRC	Promoting Carbon Dioxide Capture, Utilization, and Storage Pilot Demonstrations	CCUS demonstrations started

CCUS Policy Inventory (Selected policies) **Continued**

Year	Ministry	Policy	Impact
2016	State Council	13th FYP National Science and Technology Innovation Plan	Rapid development of CCUS
2016	NDRC	Energy Technology Revolution Innovation Action Plan (2016 – 2030)	Rapid development of CCUS
2020	PBOC, NDRC, and CSRC	Catalogue of Projects Supported by Green Bonds	Broadened financial instruments
2021	National People's Congress	Outline of China 14th FYP for National Economic and Social Development and Long-Range Objectives for 2035	Rapid development of CCUS
2021	NDRC	Reporting on Carbon Dioxide Capture, Utilization and Storage (CCUS) Projects	CCUS projects sorting and collection
2021	PBOC	Carbon Dioxide Emissions Reductions Supporting Financial Tools	Broadened financial instruments

*For more climate policies: Gallagher, K.S., et al (2021). "China: National Climate Policies." Climate Policy Lab, The Fletcher School, Tufts University

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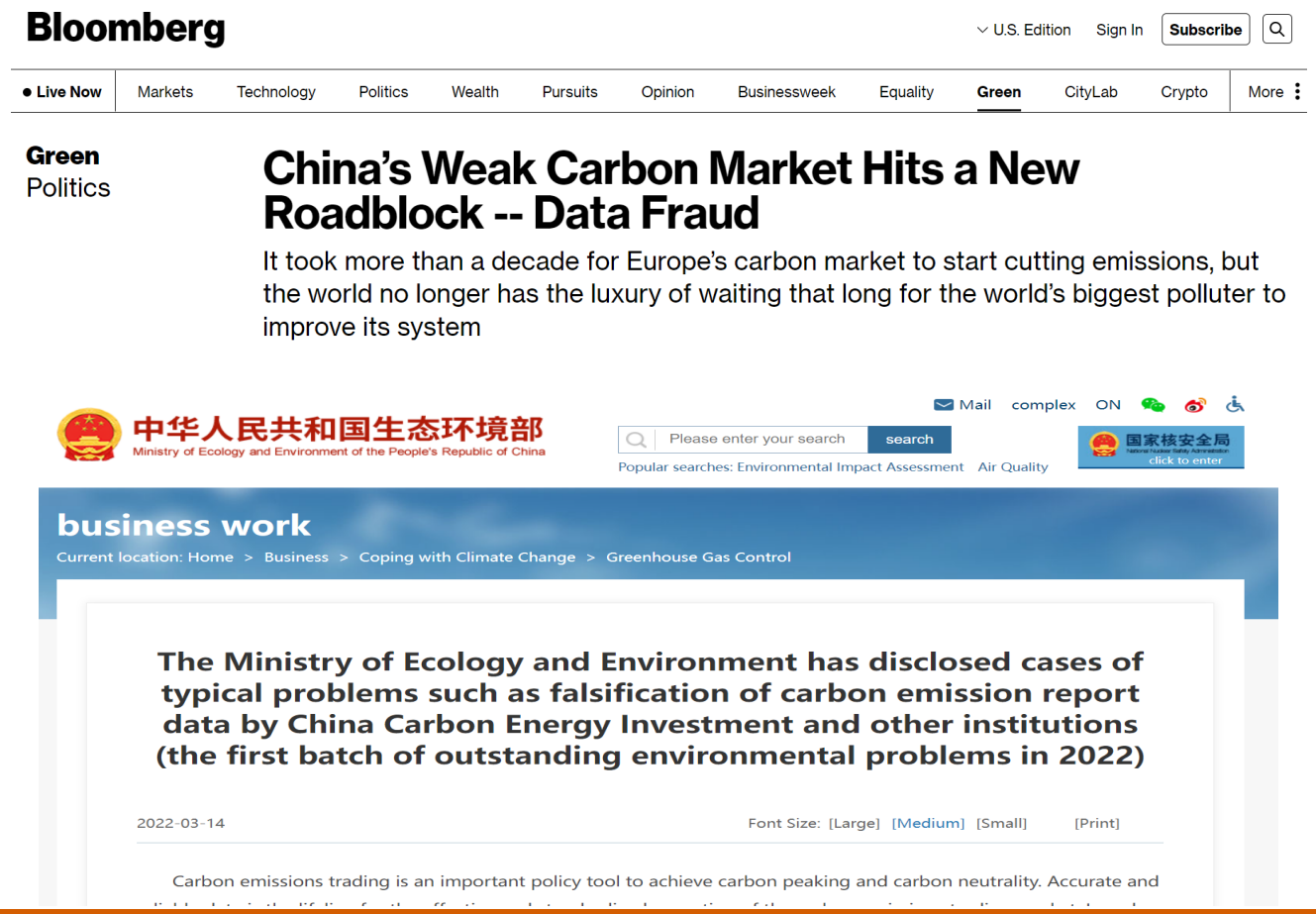
Hurdles of CCUS Deployment



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China's Weak Carbon Market Hits a New Roadblock -- Data Fraud

It took more than a decade for Europe's carbon market to start cutting emissions, but the world no longer has the luxury of waiting that long for the world's biggest polluter to improve its system

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The Ministry of Ecology and Environment has disclosed cases of typical problems such as falsification of carbon emission report data by China Carbon Energy Investment and other institutions (the first batch of outstanding environmental problems in 2022)

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Carbon emissions trading is an important policy tool to achieve carbon peaking and carbon neutrality. Accurate and

- Emissions Trading System
  - Coverage
  - Issues related to MRV
  - Incorporation of CCUS

Hurdles of CCUS Deployment

- Climate and Energy Legislation
- CCUS Infrastructure Development
- Public Perception
- Financial Mechanisms
  - Subsidies
  - Tax credits
  - Green bonds
- Sustainable Business Models
- Marketization of Energy and Electricity Prices

Thank you!

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