



CHINA AUSTRALIA
GEOLOGICAL STORAGE OF CO₂
中澳二氧化碳地质封存

Status of CCUS in China

The Administrative Centre for China's Agenda 21,
Ministry of Science and Technology of People's Republic of China

2018. 6. 26

A decorative graphic at the bottom of the slide consists of several horizontal, wavy lines in shades of red and orange, creating a layered, wave-like effect.

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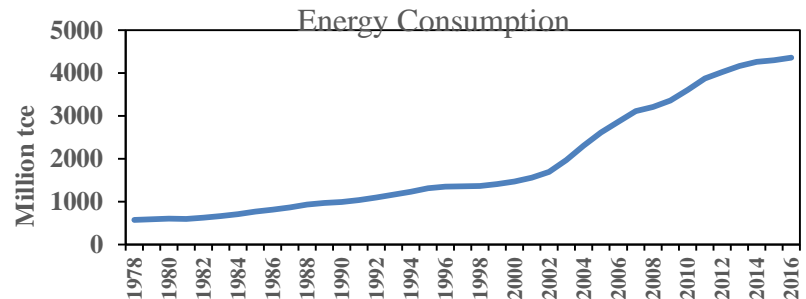
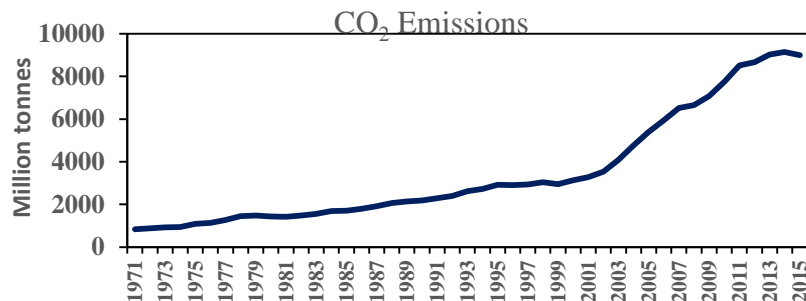
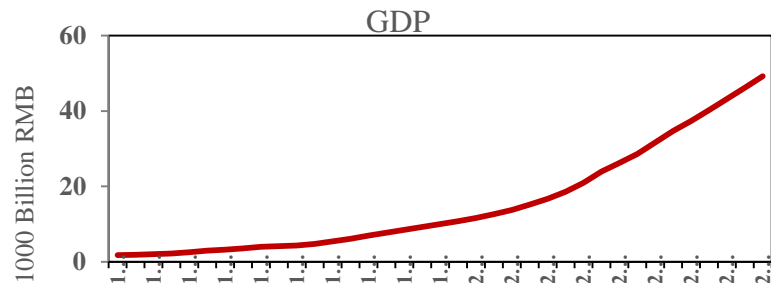
CHINA'S ECONOMY, ENERGY AND EMISSIONS



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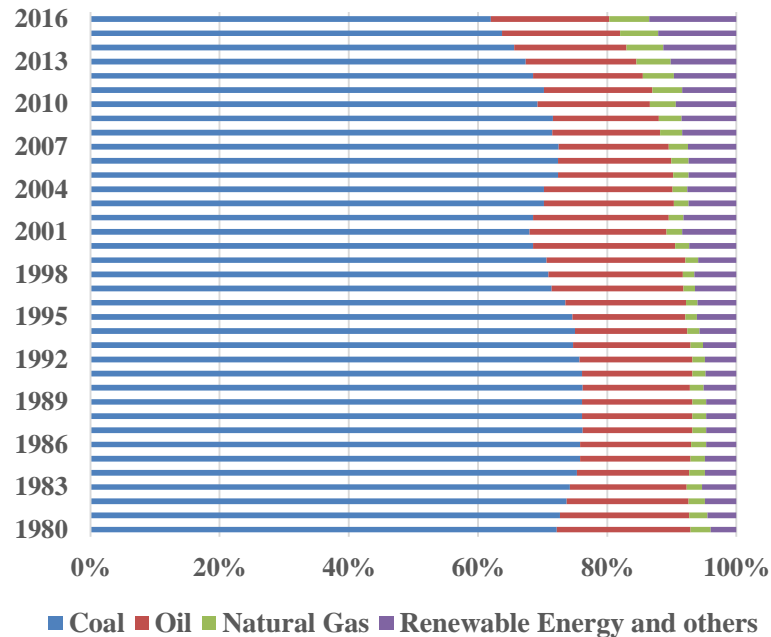
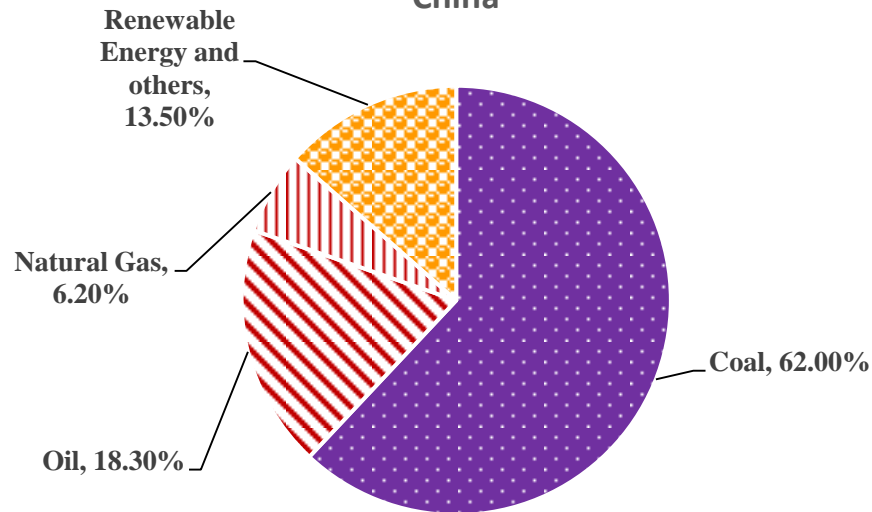
1. China's Economy, Energy and Emissions

- During the period of rapid industrialization and urbanization, the GDP from high energy-intensive industries accounted for a big proportion in China.
- The energy demand increases by 200 million tce annually in the recent years.
- From 1990 to 2015, CO₂ intensity declined by 61%, that is rare all over the world.
- From 1990 to 2015, the GDP grew by 10.7 times, while energy consumption and CO₂ emission increased by 4.4 and 4.1 times.
- CO₂ emission intensity to drop 40–45% by 2020 according to the 2005 level.



1. China's Economy, Energy and Emissions

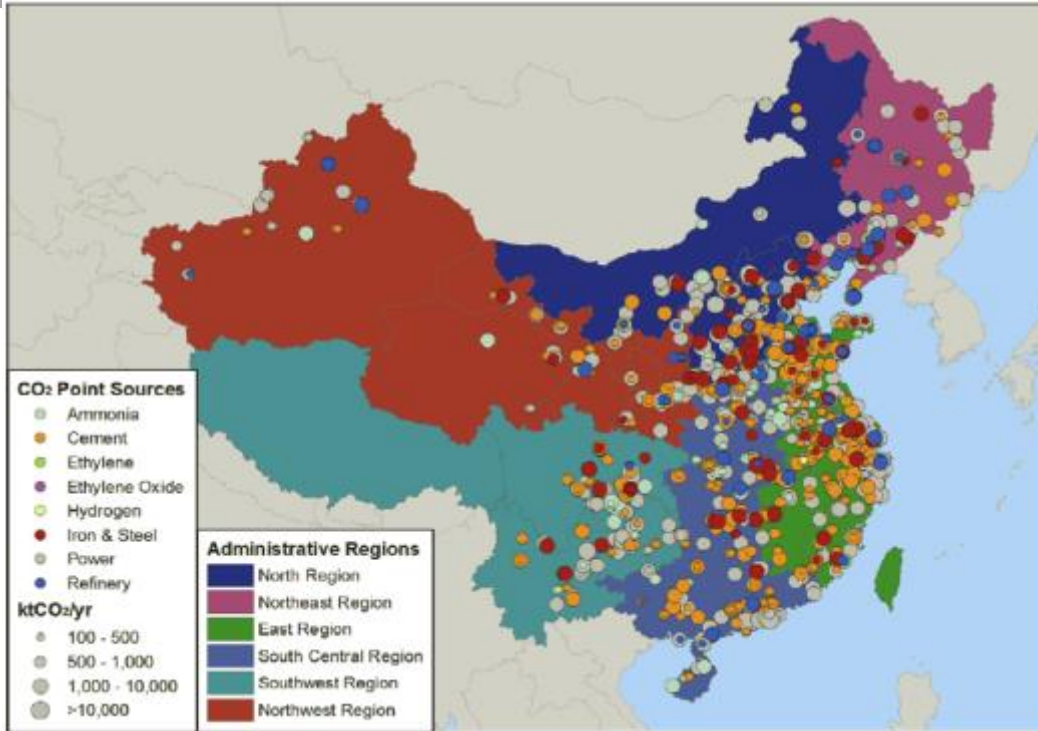
2016's Energy consumption structure in China



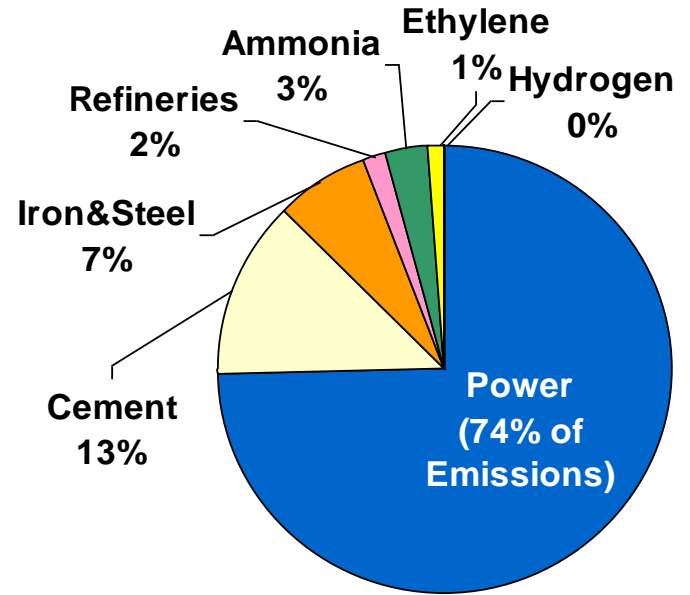
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Renewable and nuclear energy development is remarkable, the share of which in primary energy mix keeps increasing, but still could not meet the new incremental demand for energy services in quite a long time.

1. China's Economy, Energy and Emissions



Large Industrial CO₂ Emission Sources & Distribution



Industrial CO₂ emissions structure

- Power 74%, Cement 13% and Iron & Steel 7%
- The East, North and South Central

2

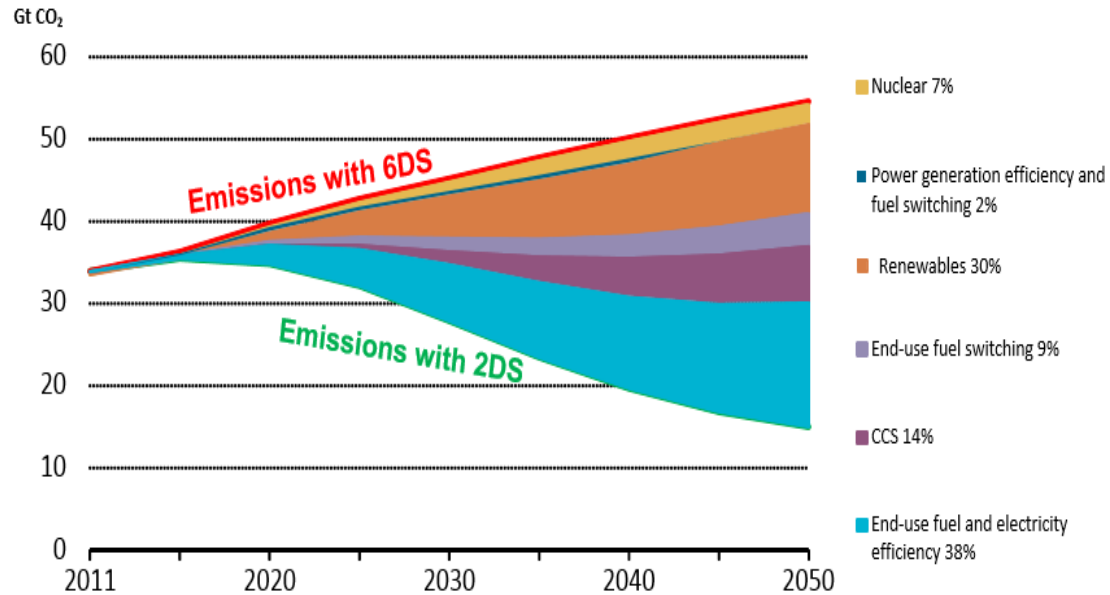
ROLE OF CCUS IN CHINA



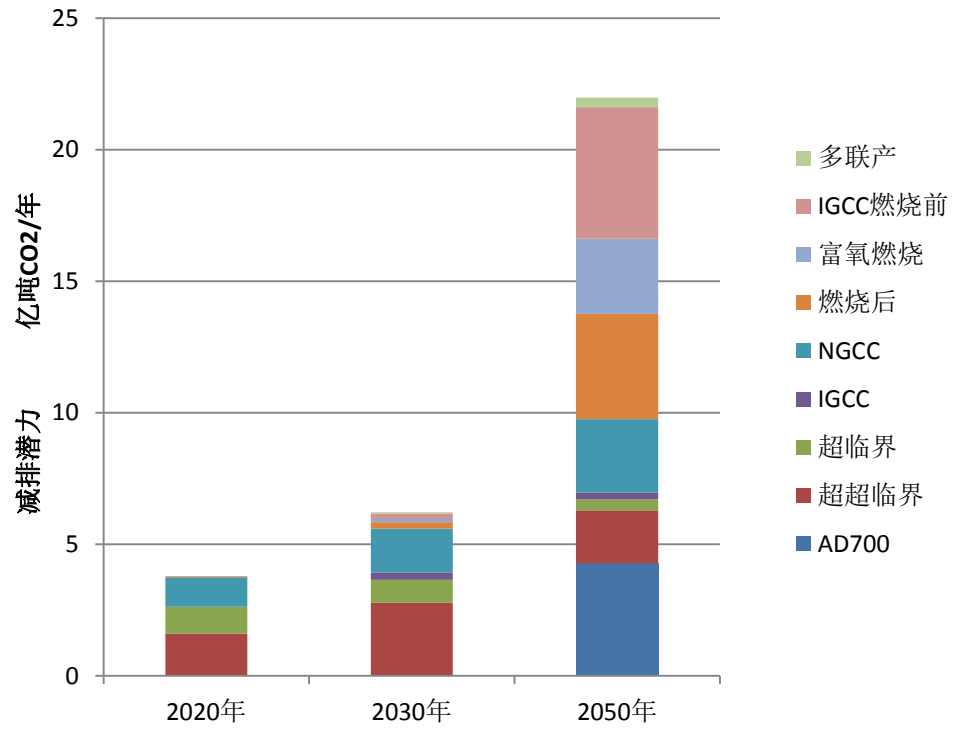
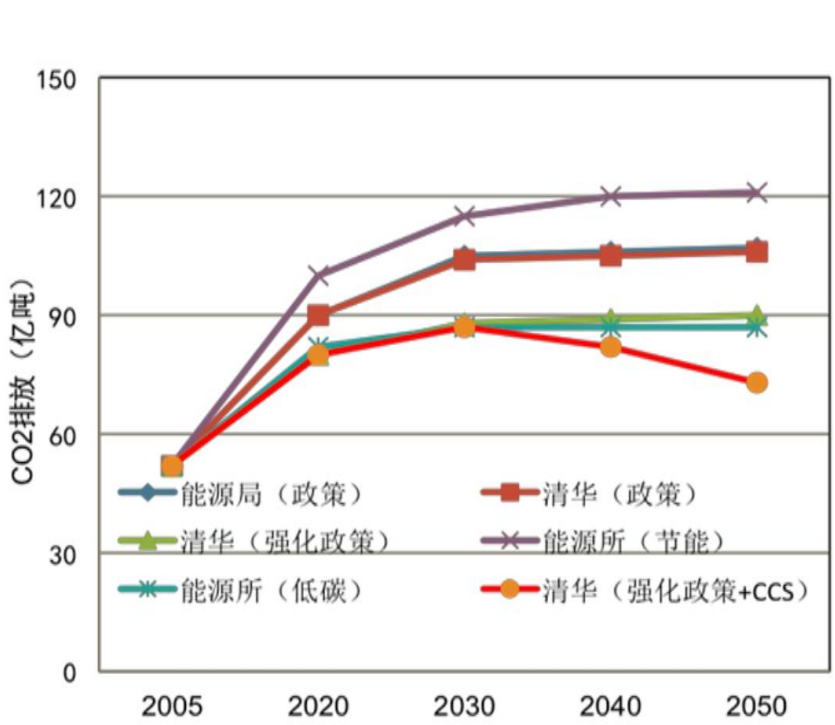
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2. Role of CCUS in China

- IPCC (2014) reports that without CCS, most climate models will not be able to meet the emissions targets. More crucially, without CCS, the cost of reducing emissions will multiply, with an estimated average **increase of 138%**.
- IEA (2016) reports that to achieve the target of no more than 2 °C increase of the global temperature, the scale of CCS deployment needs to reach about 4 billion tons by 2040, and to reach about **6 billion tons by 2050**, whereas CCS technology will contribute 14% of carbon emission reduction and **China will**

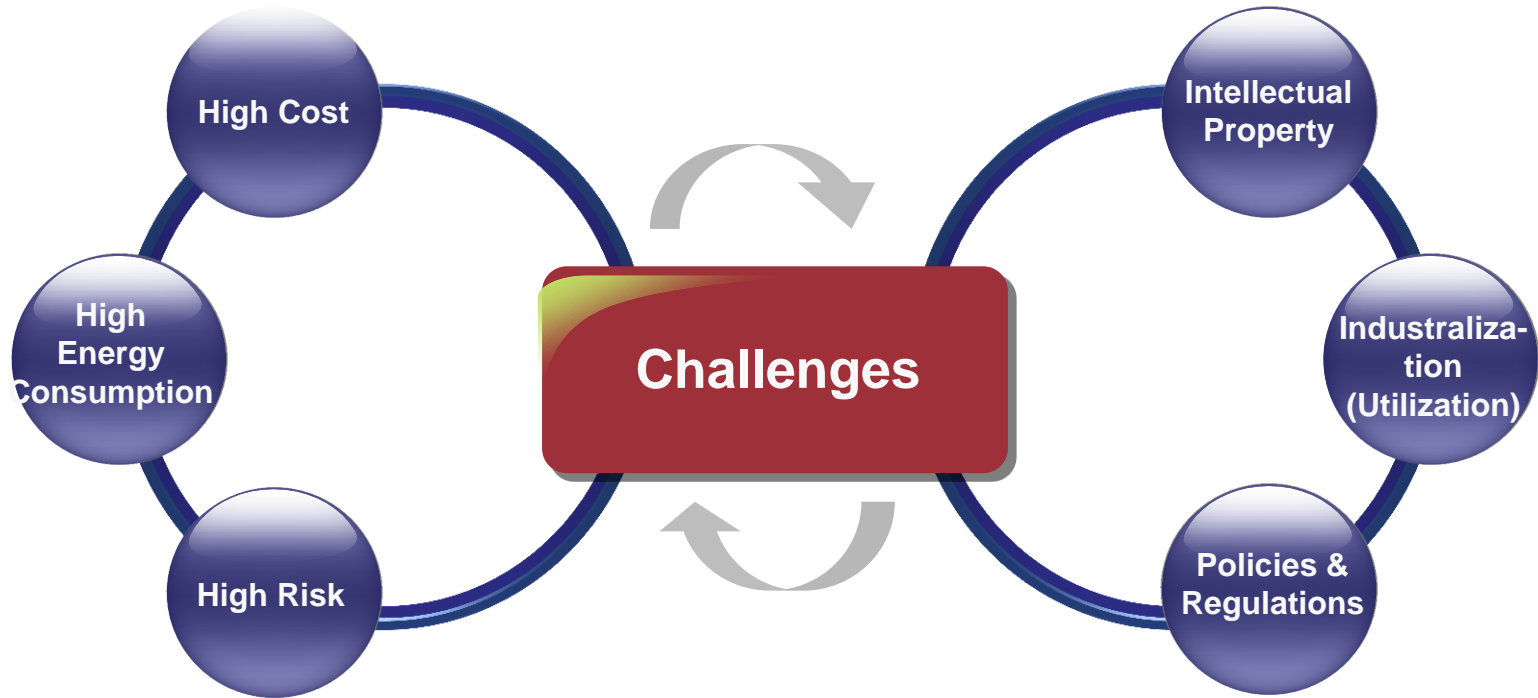


2. Role of CCUS in China



- The CO₂ Emission is expected to reach its peak by 2030;
- The carbon Intensity in 2030 will be 60%-65% less than that in 2005.

2. Role of CCUS in China



2. Role of CCUS in China

- Among emission reduction technology options, CCUS is supposed to be the only technology that can actualize low-carbon utilization of fossil fuels in a large scale.
- CCUS is an important technical approach to reduce CO₂ emissions in future, apart from improving energy conservation and energy efficiency, developing new energy and renewable energy, and increasing carbon sinks.



3

CCUS POLICIES AND R & D PROJECTS



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3. CCUS Policies and National R&D Projects

- *National Medium- and Long-Term Program for Science and Technology Development (2006–2020)*, by State Council, 2006
- *China's scientific actions on climate change*, by MOST, 2007
- *China's CCUS S&T development roadmap*, by MOST/ACCA21, 2011
- *12th National Scientific and Technological Plan on Climate Change*, by MOST, May 2012
- *Work plan for 12th 5-year National GHG Control*. by State Council, 2012
- *Special Plan for CCUS technology development*, by MOST, 2013
- *Notification of Promoting Pilot Demonstrations on Carbon Capture, Utilization and Sequestration*, by NDRC, 2013
- *Notification on Reinforcing the Environment Protection of the Pilot Demonstration Projects of Carbon Capture, Utilization and Sequestration*, by MOEE, 2016
- *Technical Guide for Environmental Risk Assessment of CO₂ Capture, Utilization and Sequestration*, by MOEE (Trial), 2016

Policies released on a national scale related to CCUS:19

Policies or Guidance Documents aiming at CCUS: 4



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General statement

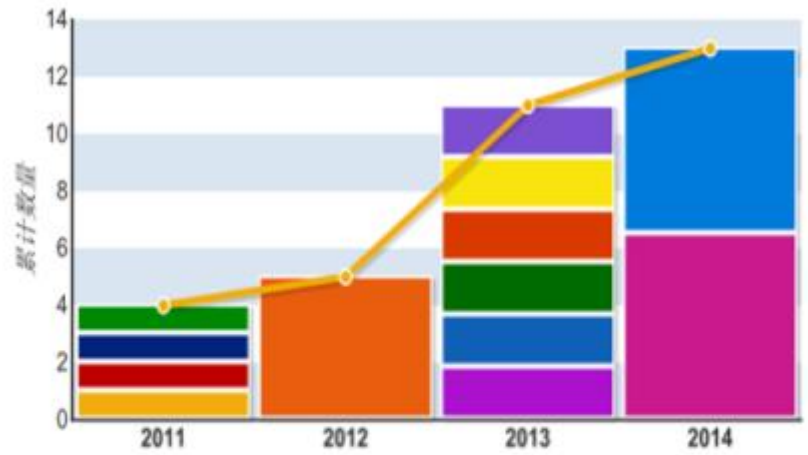
“to develop CO₂ near zero emission technology”



Detailed development measure

Targets, actions in capture, storage, utilization and storage, full-chain demo, etc

3. CCUS Policies and National R&D Projects



- 《国家“十二五”科学技术发展规划》
- 《战略性新兴产业重点产品和服务指导目录》
- 《中国碳捕集、利用与封存 (CCUS) 技术》
- 《关于推动碳捕集、利用和封存试验示范的通知》
- 《“十二五”控制温室气体排放工作方案》
- 《国家重大科技基础设施建设中长期规划 (2012-2030) 》
- 《国土资源“十二五”科学技术发展规划》
- 《关于加强碳捕集、利用和封存试验示范项目环境保护工作的通知》
- 《国家“十二五”应对气候变化科技发展专项规划》
- 《国家应对气候变化规划 (2014-2020年) 》
- 《工业领域应对气候变化行动方案》
- 《中美气候变化联合声明》
- 国家政策和规划累计数量



3. CCUS Policies and National R&D Projects

Project Title	Funding by	Duration
The Project of CCS-EOR, Utilization and Storage	973	2006–2010
Program of CO ₂ Capture and Storage technology	863	2008–2010
The Key Tech Research Program on CCS-EOR and Storage	863	2009–2011
The Key Tech Research Program on CO ₂ -Algae-Biodiesel	863	2009–2011
CO ₂ - Safety Mining with CO ₂ Gas Reservoirs and CO ₂ Utilization Tech	National Major Special Project	2008–2010
Demonstration Project of Mining and Utilization Tech of Volcanic gas containing CO ₂ in Songliao Basin	National Major Special Project	2008–2010



3. CCUS Policies and R&D Projects

Name of Projects	Funding by	Duration
Demonstration Project of CO ₂ capture and geological storage in Coal Liquification Plant, China Shenhua Group	National Key Technology R&D Programme	2011-2014
The Key Tech Research Project of CO ₂ Emission Reducing on Iron-Steel Sector	National Key Technology R&D Programme	2011-2014
Research and Demostration Program of IGCC +CO ₂ Caputure, Utilization and Storage	National Key Technology R&D Programme	2011-2013
CO ₂ Storage Capacity Assessment and Demonstration in China	China Geological Survey	2011-2014
The Program of CCS -EOR, Utilization and Storage	973	2011-2015



3. CCUS Policies and R&D Projects

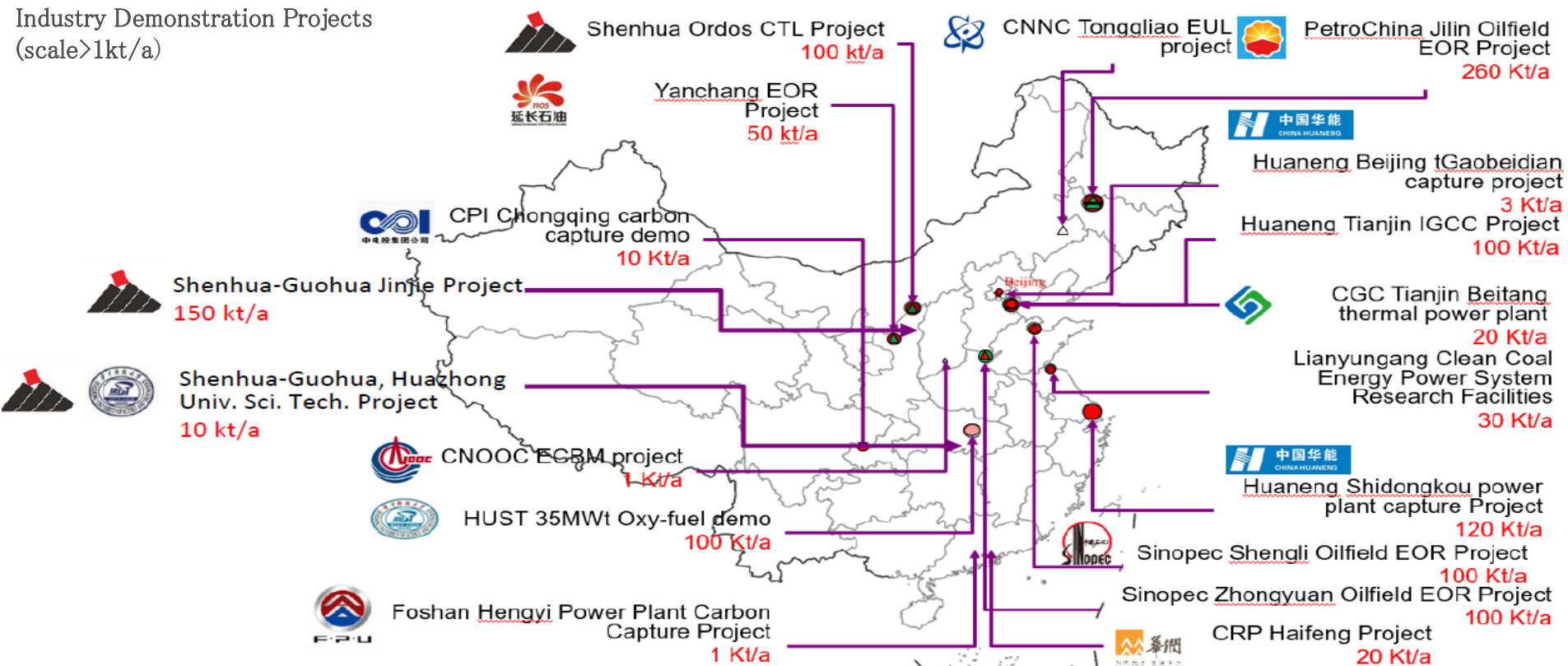
Projects	Funding by	Start Time
Key basic scientific problems based on reducing CO ₂ emission reduction and geologic sequestration	National Key Technology R&D Programme	2016
Key basic scientific problems based on CO ₂ efficient conversion and utilization	National Key Technology R&D Programme	2016
CO ₂ emission reduction technology of flue-gas microalgae	National Key Technology R&D Programme	2016
High performance absorbent/absorbent materials and techniques for capturing CO ₂	National Key Technology R&D Programme	2017
The CO ₂ capturing technology with membrane and industrial demonstrations	National Key Technology R&D Programme	2017
Key oxygen enriched combustion technologies of coal	National Key Technology R&D Programme	2018
Chemical chain combustion and gasification technologies of coal	National Key Technology R&D Programme	2018
CO ₂ -EOR technology and the security monitoring of geologic sequestration	National Key Technology R&D Programme	2018
Key technologies for enrichment and separation of coalbed methane in CO ₂ flooding	National Key Technology R&D Programme	2018
CO ₂ mineralization technologies	National Key Technology R&D Programme	2018
Key technologies of highly efficiently synthesizing chemicals with CO ₂	National Key Technology R&D Programme	2018



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3. CCUS Policies and R&D Projects

Industry Demonstration Projects
(scale > 1kt/a)



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Source: UK-China (Guangdong) CCUS Center, Institute of Rock and Soil Mechanics, Chinese Academy of Sciences, 2017

3. CCUS Policies and R&D Projects

China Power Investment,
10,000t/a capture pilot



Huazhong University of S&T (HUST)
35MWt Oxy-fuel pilot,



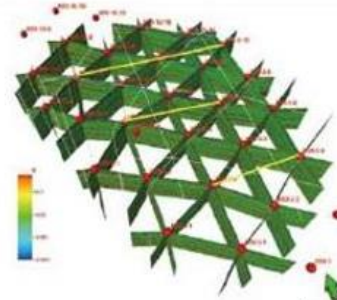
Huaneng Group
Gaobeidian & Shidongkou Power Plant Demo



3. CCUS Policies and R&D Projects

PetroChina

CO₂ EOR ,Jilin Oilfield



ENN Group
Micro algae Bio-fuel Pilot
Capacity: 20,000t/y

China United Coalbed Methane

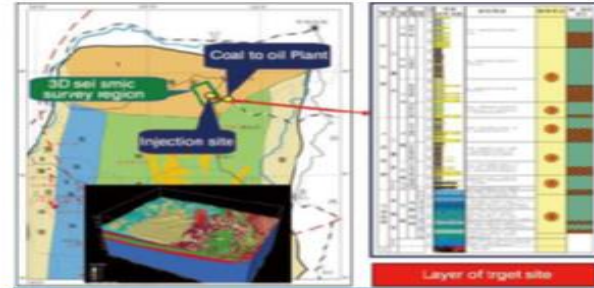
ECBM Pilot Project

Qinshui, Shanxi



3. CCUS Policies and R&D Projects

SINOPEC, Shengli Oil Field
CO₂-EOR, 1Mt CO₂/year



Shenhua Group
Erdos, 3Mt/a

3. CCUS Policies and R&D Projects

Projects	Partners	Duration
China–Australia Geological Storage of CO ₂ (CAGS)	RET, GA	2010–
China–EU NZEC Cooperation	UK, EU, Norway	2007–
China–EU Carbon Capture and Storage Cooperation (COACH)	EU	2007–2009
Sino–Italy CCS Technology Cooperation Project (SIRACO)	ENEL	2010–2012
China–US Clean energy Research Center	MOST, NEA, DOE	2010–2015
CSLF Capacity Building Projects	CSLF	2012–
MOST–IEA Cooperation on CCUS	IEA	2012–



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4

CONCLUSION



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4. Conclusion

CCUS is important to China

CCUS is considered a key technology to develop and promote in mitigating climate change:

- In the long term, it is an important technical option for CO₂ reduction.
- In the short term, it could serve as an important tool to solve energy and resource problems, e.g. enhanced exploration of shale gas, geothermal, saline water and liquid mineral.

4. Conclusion

Improving environment is essential

- Besides technology R&D programs, boosting policies are essential for the take off of CCUS.
- The nature of CCUS technology calls for enhanced international collaboration.



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Thank You!

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