

CSLF Technical Group Meeting, Seoul Korea
25 March 2014

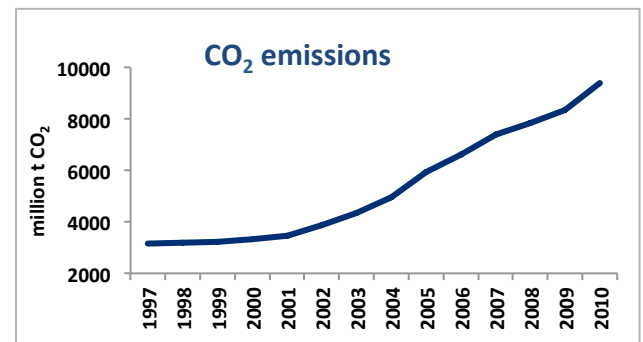
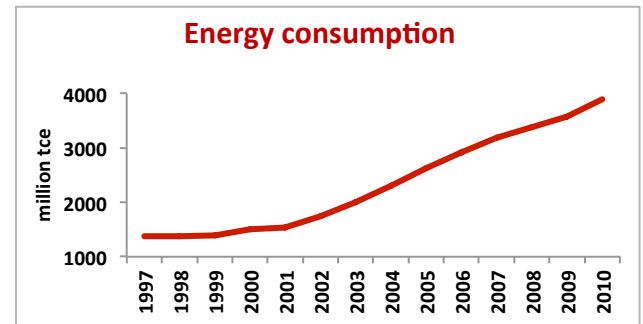
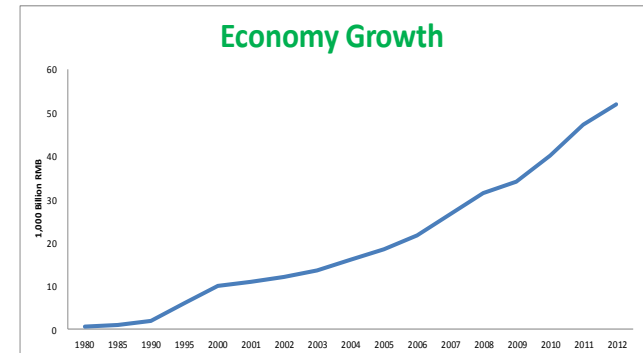
CCS Technologies and Projects for Emerging Economies--CHINA

Dr. ZHANG Jiutian

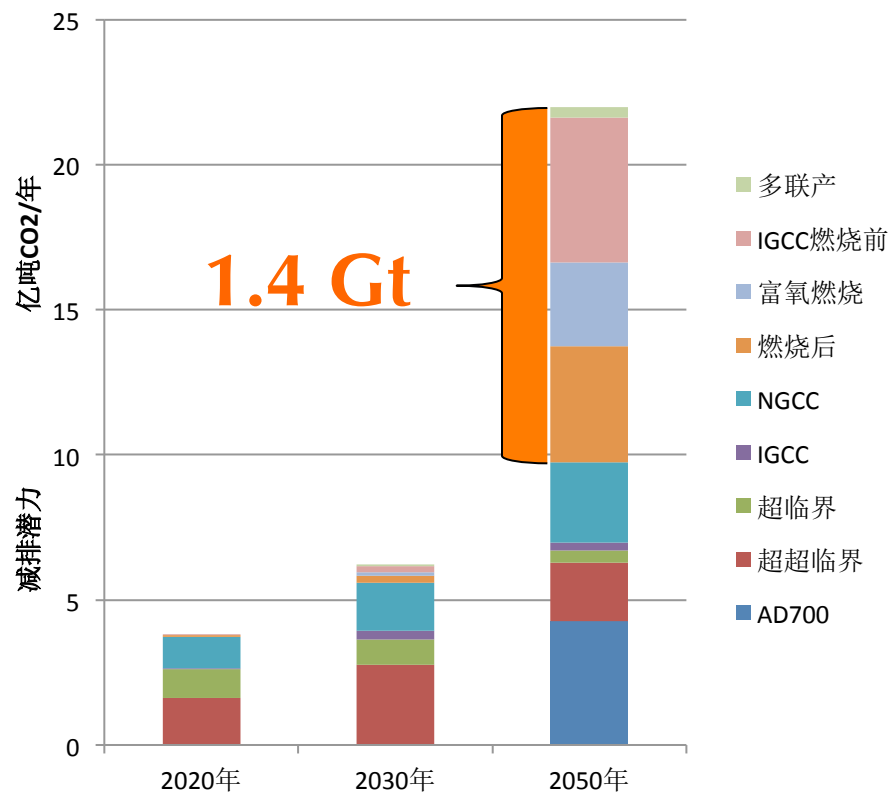
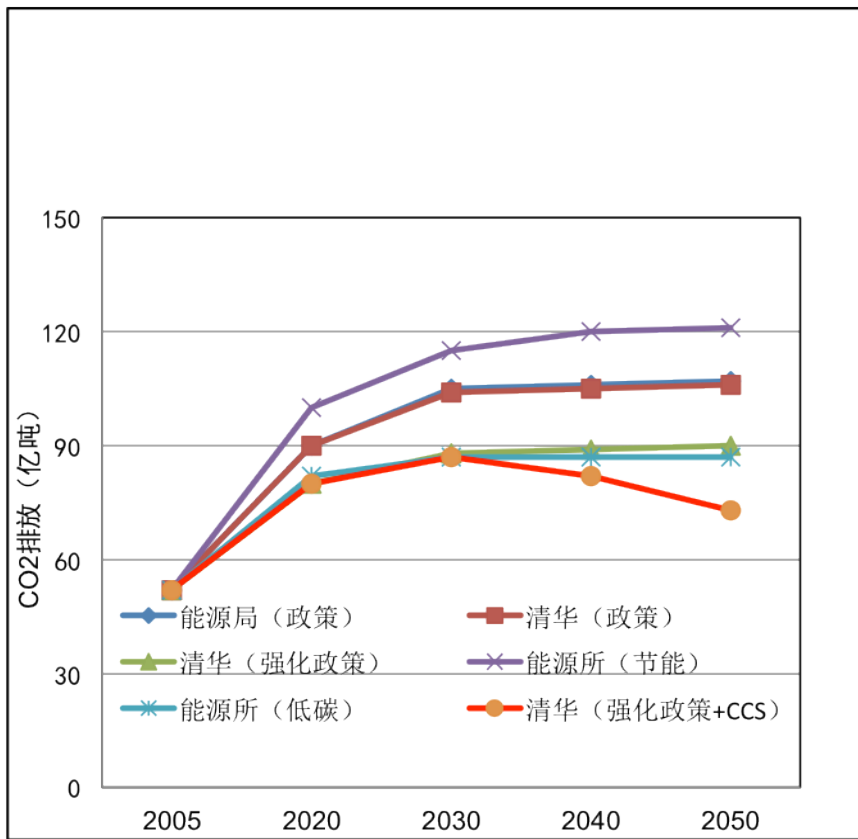
The Administrative Centre for China's Agenda21(ACCA21)
Ministry of Science and Technology (MOST)

Economy, Energy and Emissions in China

- 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 2010, CO₂ intensity declined by 57%, that is rare all over the world.
- From 1990 to 2010, the GDP grew by 7.3 times, while energy consumption and CO₂ emission increased by 3.3 and 3.0 times.
- CO₂ emission intensity to drop 40-45% by 2020 according to the 2005 level.



Scenario analysis suggests CCUS will play important role in mid- and long-term.



Policies are getting into details gradually

- 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
- 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
- S&T roadmap of China's CCUS development
by MOST/ACCA21, 2011
- Special Plan for CCUS technology development
by MOST, 2013

General statement

"to develop CO₂ near zero emission technology"

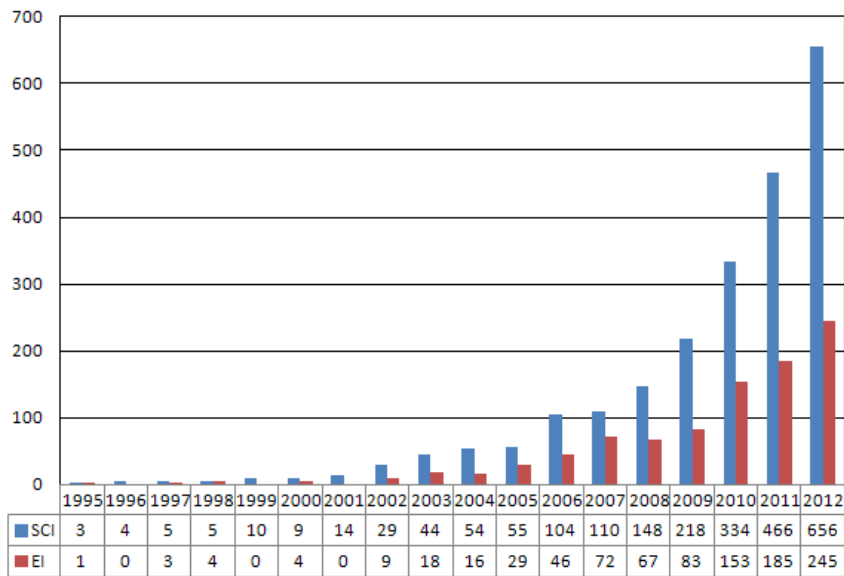


Detailed development measure

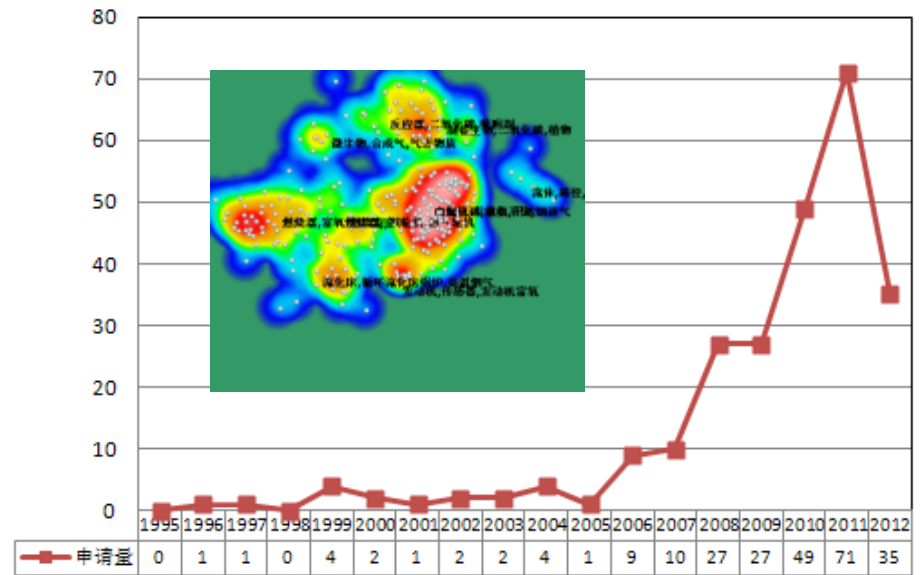
Targets, actions in capture, storage, utilization and storage, full-chain demo, etc

Trends of Paper & Patent on CCUS (1995-2012)

SCI & EI Papers



Domestic Patents



CCUS Progress Summary: R&D

- R&D Activities in the 11th FYP**

Project Title	Funding by	Duration	Type of projects
The Project of CCS–EOR, Utilization and Storage	973	2006-2010	Basic Research
Program of CO2 Capture and Storage technology	863	2008-2010	Technology R&D
The Key Tech Research Program on CCS-EOR and Storage	863	2009-2011	
The Key Tech Research Program on CO2-Algae-Biodiesel	863	2009-2011	
CO2- Safety Mining with CO2 Gas Reservoirs and CO2 Utilization Tech	National Major Special Project	2008-2010	R& D
Demonstration Project of Mining and Utilization Tech of Volcanic gas containing CO2 in Songliao Basin	National Major Special Project	2008-2010	

CCUS Progress Summary: R&D

- R&D Activities in the 12th FYP**

Name of Projects	Funding by	Duration	Type of projects
Demonstration of CO2 capture and geological storage in Coal Liquefaction Plant, Shenhua Group	National Key Technology R&D Programme	2011-2014	Technology R&D
The Key Tech Research Project of CO2 Emission Reducing on Iron-Steel Sector		2011-2014	Technology R&D
Research and Demostration Program of IGCC +CO2 Caputure, Utilization and Storage		2011-2013	
CO2 mineralization technology research and demo		2012-2015	
Research and Demo on CO2 chemical utilization		2012-2015	
The Program of CCS –EOR, Utilization and Storage	973	2011-2015	Basic Research

CCUS Progress Summary: Enterprise Action

Project Title	Scale	Capture Tech	Storage/ Utilization	Status
The pilot project of CO2 Capture, Huaneng Beijing Gaobeidian Thermal Power Plant	Capture Capacity:3,000 T/Y	Post -Combustion	Food Use	Operated in 2008
Demonstration Project of CO2 capture and storage in Coal Liquefaction Plant, China Shenhua Group	Capture Capacity:100,000 T/Y Storage Capacity: 100,000 T/Y	Coal liquefaction	Saline Aquifer	operated in 2011
Demonstration Project of CO2 capture, Storage and Utilization in IGCC Plant Greengen of Huaneng	Capture Capacity:60,000--100,000 T/Year	Pre -Combustion	EOR	Launched in 2011
Small Scale Demonstration Project on CO2 Capture and EOR in Shengli Oil Field, Sinopec	Capture/Utilization:40,000T/Y	Post -Combustion	EOR	Operated in 2010
Demonstration Project of CO2 capture, Shanghai Shidongkou Power Plant, Huaneng	Capture Capacity:120,000 T/Y	Post -Combustion	Food/ Industrial	Operated since 2010
Demonstration project of Carbon Capture, Shuanghuai Power Plant, China Power Investment	Capture Capacity:10,000 T/Y	Post -Combustion	Food/ Manufacture	Operated in 2010
Pilot Plant of CO2 capture in Lianyungang City, CAS	Capture Capacity:30,000 T/Y	Pre -Combustio	N/A	Operated in 2011

Demonstration

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



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



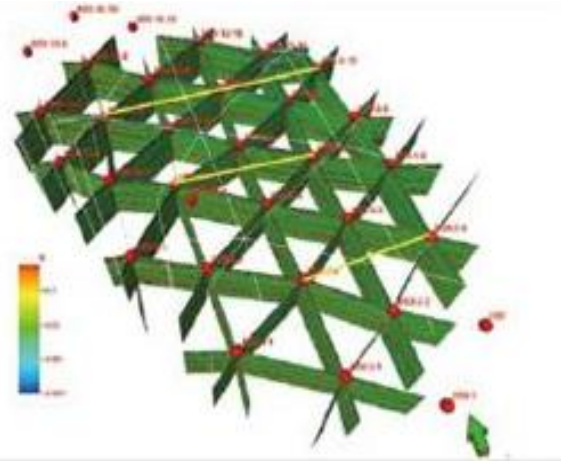
Huaneng Group
Gaobeidian & Shidongkou Power Plant Demo



Demonstration

PetroChina

CO₂ EOR ,Jilin Oilfield



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



China United Coalbed Methane

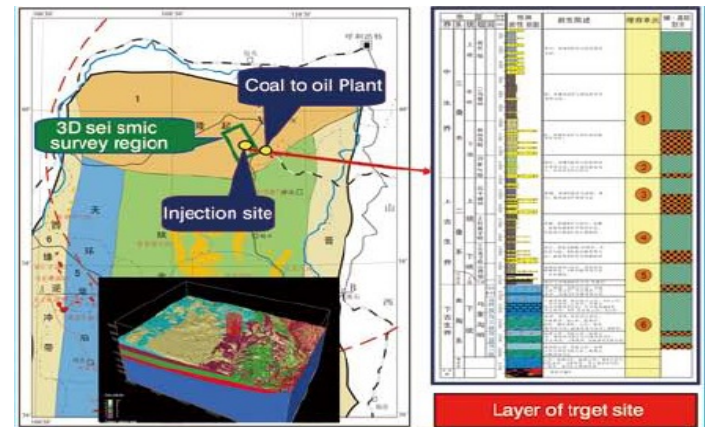
ECBM Pilot Project

Qinshui, Shanxi



Demonstration

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



Shenhua Group
ErDOS, 0.3Mt/a

The Administrative Centre for China's Agenda 21 (ACCA21)

- China's Agenda 21 issued after Rio summit, ACCA21 was founded in 1994 to implement the China's Agenda 21 to promote sustainable development in China
- Strategy research regarding sustainable development
- Manage the S&T projects funded by MOST in the area of
 - Resources and environment
 - Ocean technologies
 - Social development
 - Climate change, including CCUS

CCUS Activities by ACCA21

- Strategy and policy research
 - Technological Roadmap
 - Special S&T Plan for CCUS
 - Assessment Report on Utilization Technology in China
- Manage the S&T projects of CCUS
 - Researches by Universities and Institutes
 - Demonstrations by SINOPEC, HUANENG, YANCHANG OIL, SHENHUA, etc

Technology interests

- Open to different technical options
- Technical aspects
 - Problems found during demonstration
 - Integrated Solutions to solve not only CO₂ issues
 - CO₂ Utilization

Capacity Building Needs

- Promoting consensus on key issues
 - Potential & costs based on life cycle assessment
- Public awareness
 - Local officials, public, students, ...
- CCUS Potential and technical options in different regions

THANK YOU

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