



China-Australia capacity building program on the geological storage of carbon dioxide (CAGS)

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The Administrative Centre for China's Agenda 21

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1. China-Australia Geological Storage of CO₂ Project Phase I
2. China-Australia Geological Storage of CO₂ Project Phase II

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1. China-Australia Geological Storage of CO₂ Project Phase I

- Drivers
- Objectives
- Activities
- Outcomes



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CAGS: Drivers

- To share the knowledge and experiences about geological storage
- To share reliance on fossil fuels and both need to reduce CO₂ emissions
- To assist in the development of a skilled Chinese workforce
- Lack of the international collaborations on geological storage



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About CAGS I

- CAGS is a bilateral project between China-MoST and Australia-RET
- 2010-2012, two years
- Jointly managed by:
 - **Geoscience Australia**, Department of Resources, Energy and Tourism
 - **The Administrative Centre for China's Agenda 21**, Ministry of Science and



Australian Government
Geoscience Australia



中国21世纪议程管理中心
The Administrative Center for China's Agenda 21

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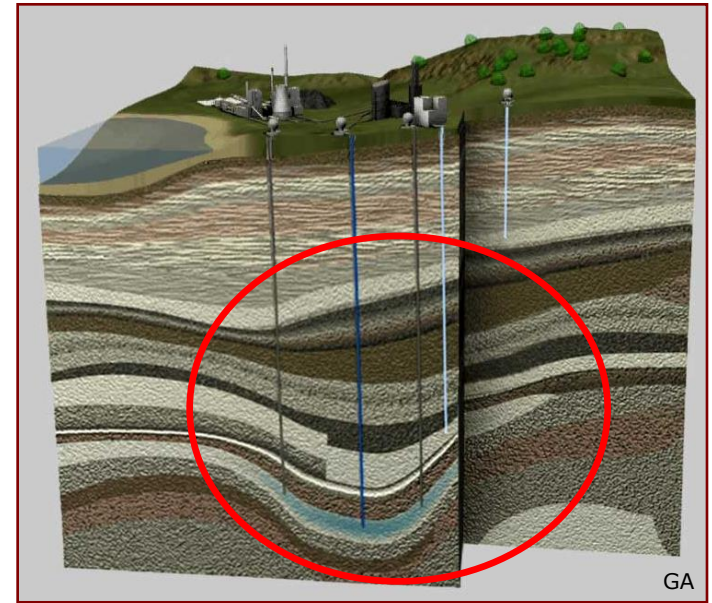
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CAGS I Project Objectives

The focus for CAGS is capacity building on **geological storage of CO₂** in China

- Talents (CCS schools + Visiting scholars program)
- Knowledge sharing (Workshops, study tour)
- Research of some key issues (3 Projects)
- Public awareness (Networking, dissemination)



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Partners & Participants



National
Development
and Reform
Commission



Department
of Resources,
Energy and
Tourism

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Australian Government
Geoscience Australia

- CUP
- IGG (CAS)
- IRSM (CAS)
- CGS
- CAEP (MEP)
- Tsinghua U
- SCSIO (CAS)
- Petroleum, power industry & others

- CO2CRC
- GCCSI
- CSIRO
- ASP/UA
- UNSW
- State geological surveys
- International experts
- Petroleum, power industry & others

- COACH & Others
- NZEC
- USA Australia-China JCG



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CAGS I Activities

Capacity Building

3 Workshops (300)

3 Summer Schools (130)

9 Visiting scholars

Study Tour (March '12)

Conferences (22)

Website & Networks

Publications

Research

Research Project 1

Research Project 2

Research Project 3

**Final
Symposium
April 17-18, 2012**

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CAGS I Activities: Technical Workshops

- Workshop 1: Site selection and capacity assessment for geological storage. Canberra, 19-21 Jan, 2010
- Workshop 2: Risk assessment, safety and environmental and monitoring of CO₂ storage. Wuhan, 27-29 Oct, 2010
- Workshop 3: CO₂ storage and EOR. Changchun, 11-15 July, 2011



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CAGS I Activities: CCS Schools

- 3 CCS technical schools
- Wuhan, 2010; Sanya, 2011; and Beijing, 2012
- 130 Postgraduates



CAGS I Activities: Visiting Scholar Program

Home institution (China)	Host institution (Australia)	Project	Duration
Administrative Centre for China's Agenda 21	Geoscience Australia	Policy and regulation for CO ₂ storage	1 month
China Geological Survey	Cooperative Research Centre for Greenhouse Gas Technologies (CO ₂ CRC) / University of Adelaide	Hydrogeological characterisation of the subsurface at the Otway Basin project site	3 months
Institute of Rock and Soil Mechanics, Chinese Academy of Sciences	University of Queensland	Experimental and numerical investigations on CO ₂ storage and ECBM	1 month
Institute of Geology and Geophysics, Chinese Academy of Sciences	CO ₂ CRC / University of Adelaide	Rock fracture mechanics and cap rock stability	4 months
Chinese Academy of Environmental Planning	Geoscience Australia	Environmental monitoring systems and CO ₂ storage	3 months
Tsinghua University	Geoscience Australia	Integrated numerical simulation and performance of CO ₂ plumes in saline aquifers	6 months
China University of Petroleum	Commonwealth Scientific and Industrial Research Organisation (CSIRO)	Effects of CO ₂ injection, supercritical CO ₂ and water on reservoir rock characteristics	3 months
Institute of Rock and Soil Mechanics, Chinese Academy of Sciences	CO ₂ CRC / University of Adelaide	Effects of CO ₂ -water-rock interactions on mechanical properties of rocks	2.5 months
China University of Mining and Technology	Geoscience Australia / CSIRO	Investigation of methods for tracing CO ₂ in the subsurface	12 months

CAGS I Activities: Research Projects

Project 1: Site selection methodology and criteria of CO₂ geological storage

- China Geological Survey; Institute of Geology and Geophysics, Chinese Academy of Sciences; Institute of Rock and Soil Mechanics, Chinese Academy of Sciences; Tsinghua University

Project 2: Selection criteria of oil/gas reservoirs for CO₂ EOR and storage

- China University of Petroleum (Beijing), Institute of Geology and Geophysics; Chinese Academy of Sciences; CNPC Research Institute of Safety & Environment Technology

Project 3: Study of the environmental impact and risk management of CO₂ storage

- Chinese Academy of Environmental Planning; Chinese Academy of Sciences (IRSM), Tsinghua University; China Geological Survey



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CAGS I Outcomes: Research Projects

- To establish site selection index system of deep saline aquifer CO₂ geological storage is established in China from four aspects of site selection technology, security, economic suitability and conditions of ground geological.



- To analyze the potential of CO₂ storage in the reservoir, Liaohe Oilfield.
- An investigation into the possible environmental impacts and risks associated with CO₂ storage, completed through literature review and numerical simulation.

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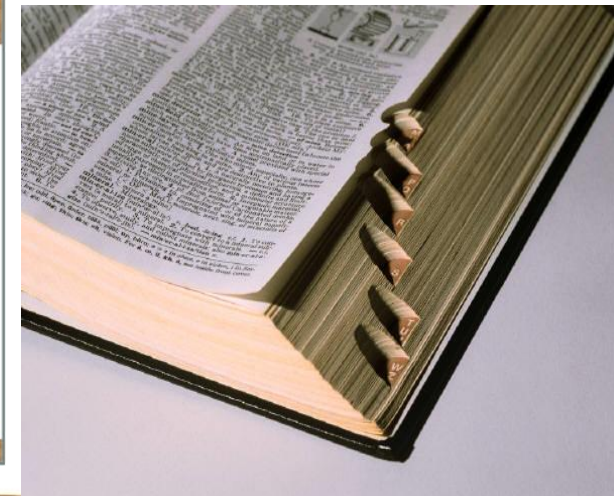


CAGS I Outcomes : Public Awareness Raising

- CCUS Brochures
- CCUS Dictionary
- Website
- Newsletter



www.cagsinfo.net



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CCUS Brochure for the public

- Is CO₂ harmful?
- What is the Greenhouse Effect and Global Warming?
- What are the adverse/negative effects of Global Warming?
- What are the key measures to reduce carbon dioxide emissions?
- What is CO₂ Capture, Utilization and Storage (CCUS)?
- What are the strengths/advantage of CCUS?
- Where can CO₂ be captured?
- How to capture CO₂?
- How is the captured carbon dioxide transported?
- Where the CO₂ can be stored?
- What's the form of sequestered CO₂ underground?
- What are the ways for CO₂ utilization?
- Is CCUS safe and reliable?
- What are the major CCUS challenges?
- How the public do contribution to mitigation of climate change?



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CAGS I Outcomes: Knowledge Sharing

- **Workshops**

200 participants attended at least 1 workshop

- **CCS summer schools**

130 students from China and Australia

- **Networking and linking: Gov, institute, enterprise, NGOs**

51 Chinese organisations and 21 Australian / Int'l organisations

- **Visiting scholar program**

5 Chinese researchers

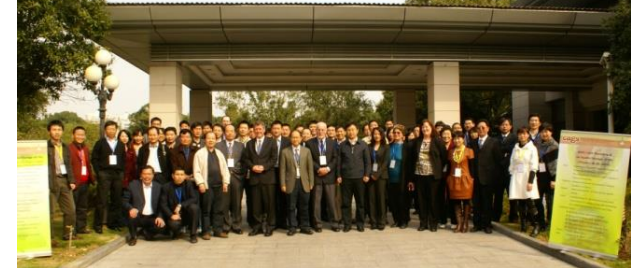
4 Chinese doctoral students

- **CCS conference support**



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CAGS I Outcomes: Policy Supporting

- Storage capacity assessment methods and tools (EOR and aquifers)
- Storage site selection and assessment criteria
- Environmental Impact Assessment (EIA) guideline
- Risk assessment and management guidelines



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Significant of CAGS I

- Further international cooperation on CCUS, speed up tech transfer and knowledge sharing
- Build a skilled and experienced Chinese workforce
- Good opportunities for postgraduate students and early career researchers to involve in CCS
- Enhancing public awareness on CCUS
- CAGS Research results support Chinese government policy and decision makers



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2. China-Australia Geological Storage of CO₂ Project Phase II

- Objectives
- Activities



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CAGS Phase II: Objectives

- To strengthen the cooperative relationship between China and Australia in addressing the challenges of reducing greenhouse gas emissions
- To accelerate knowledge sharing and deployment of advanced energy technologies between our two countries



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CAGS Phase II: Activities

- CAGS phase II will be conducted :
 - Duration: 2012 – 2014, through the Australia-China Joint Coordination Group on Clean Coal Technology
 - Funding: AU\$1.39m , by RET, Australia
- The activities including:
 - Research projects
 - Workshops and schools
 - Visiting scholar program



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CAGS Phase II: Activities

4 research projects have been signed by ACCA21 & GA

- **Project 1:** CO₂ geological storage: target area selection and evaluation method---- *Center for Hydrogeology and Environmental Geology, China Geological Survey*
 - To investigate the screening methods, selection criteria and ranking of target areas for CO₂ geological storage
- **Project 2:** Possibility and potential of CO₂ enhanced shale gas recovery in the Ordos basin---- *China University of Geosciences(wuhan), Tsinghua University*
 - To investigate the feasibility and potential enhanced shale gas recovery in the Ordos basin



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CAGS Phase II: Activities

• **Project 3:** Current status and gaps in essential technology, equipment and material for implementing CO₂ saline aquifer storage projects in China----**Institute of Rock and Soil Mechanics Chinese Academy of Science, CAS**

-To investigate the status and identify the gaps in technology needed for implementing CO₂ saline aquifer storage projects in China

• **Project 4:** Key parameters for environmental impact and risk assessment of CO₂ geological storage----**Chinese Academy of Environmental Planning, Institute of Rock and Soil Mechanics Chinese Academy of Science, CAS**

- To recommend the methodology for environmental risk assessment of CO₂ geological storage and the key elements for environmental monitoring



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Conclusion and Perspectives

- CCUS should not only aim for CO₂ reduction but also serves as important tool to solve energy and resource issues, e.g. enhanced exploration of shale gas, geothermal, saline water and liquid mineral.
- Besides technology R&D, enabling 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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