Near Zero Emissions Coal Initiative:

China-UK Collaboration

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UNFCCC Workshop, Bonn
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Political Context

- CCS in the G8 Gleneagles Plan of Action, 2005

Commitment by the G8 nations to '*work to accelerate the development and commercialization of Carbon Capture and Storage technology'* through:

Engaging the IEA and the CSLF to '*hold a workshop on short-term opportunities for CCS in the fossil fuel sector, including from Enhanced Oil Recovery and CO2 removal from natural gas production*; also '*to study definitions, costs, and scope for 'capture ready' plant and consider economic incentives'* and '*collaborating with key developing countries to research options for geological CO2 storage'*.

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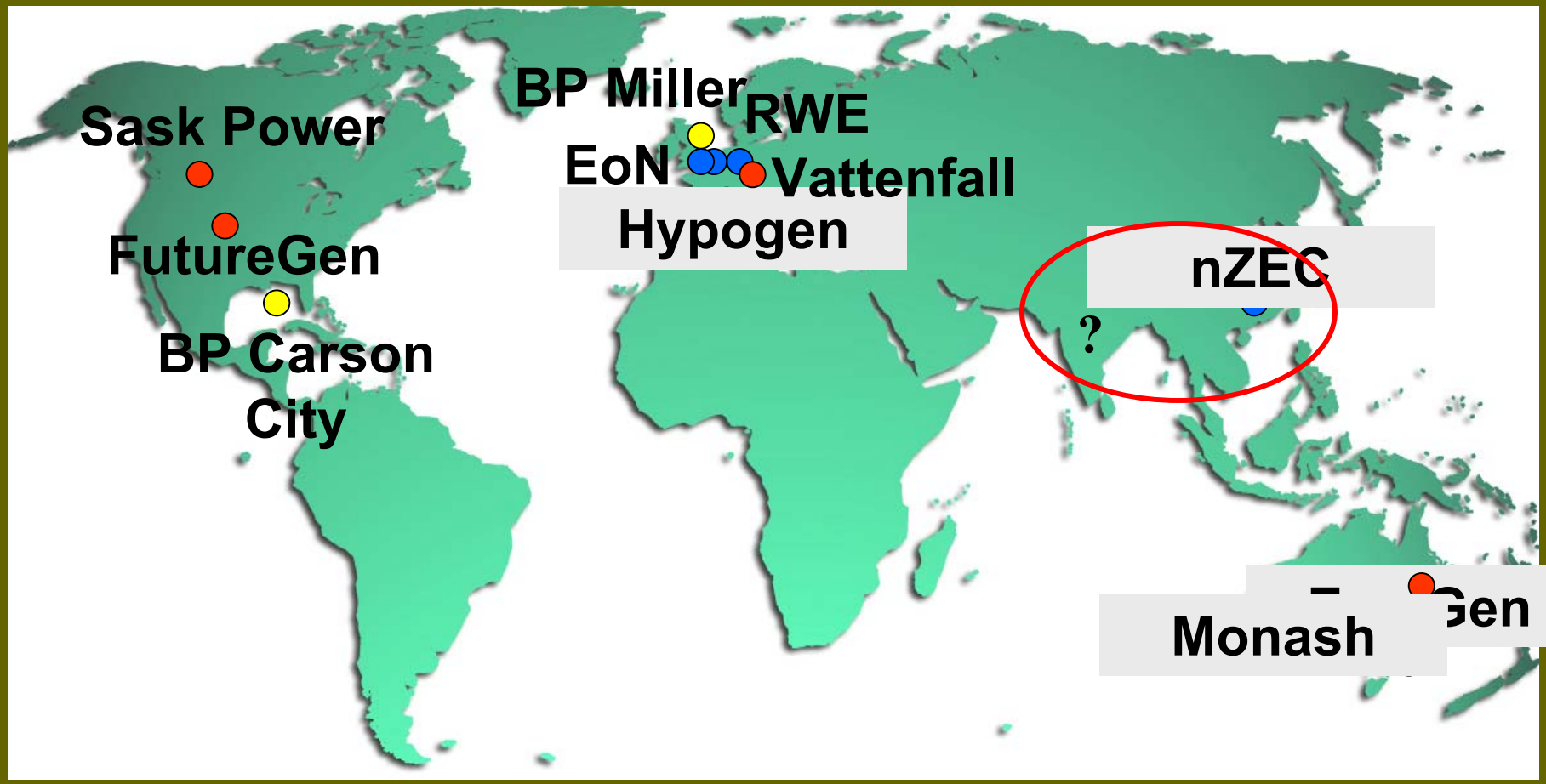
Power Sector CCS Projects



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Near Zero Emissions Coal Initiative

EU-China Summit (September 2005)

•Joint Declaration on Climate Change & Energy

*" **We will aim to achieve the following co-operation goals by 2020:** To develop and demonstrate in China and the EU advanced, near-zero emissions coal technology through carbon capture and storage "*

Objectives

- Assess the Potential for near-zero emissions coal use through CCS in China.
- Develop expertise and capacity for CCS in China.
- Develop & Demonstrate in China and EU, advanced near-zero emissions coal technology for power generation by 2020.

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NZEC Implementation

Political Agreement supported by two complementary Memoranda of Understanding with common and shared objectives for both MoU:

China-UK MoU signed December 2005
China-EC MoU signed February 2006

Resulting in two parallel but complementary projects:
UK Near Zero Emissions Coal Initiative (£3.5M) and the EC (€1.6M) funded FP6 COACH project.

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NZEC Phased Approach

Phase 1	Exploring the Options for Zero Emissions Coal (CCS) in China.	Appraise+Select options: ca. 3 Years 2006-2008
Phase 2	Define and Design a Demonstration Project.	Define Stage c.a. 2 years 2008-2010
Phase 3	Construct & Operate Demonstration Project.	Execute stage 3-4 years 2010-2014

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Shared MoU Objectives for Phase 1

a) The development of knowledge, expertise and experience in carbon dioxide capture and geological storage;

b) The assessment of the potential for carbon capture and geological storage in China;

c) The identification of opportunities for demonstration and deployment of carbon capture and storage in China;

d) The review of costs and economics of near-zero emissions coal technology through carbon capture and storage in China;

e) The identification of options for financing the research and demonstration of carbon capture and storage in China;

Current CCS activities in China

- Capture

  Several academic institutes have undertaken research on carbon capture technologies, including pre-combustion and post combustion technologies.

- Storage

  Activities on CO_2 storage include Enhanced Oil Recovery projects, Enhanced Coal Bed Methane projects.

- Projects include the implementation of the GreenGen project by the China Huaneng group and the Yantai IGCC demonstration project for capture and storage of CO_2 and hydrogen production

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Government support for CCS activities in China

- China was one of the initial members of the CSLF and MOST actively represents China within this forum.
- CCS was integrated into the *National Medium and Long Term Science and Technology Plan towards 2020* as leading edge technology.
- In the 11th five-year plan period (2006-2010), the National High-tech R&D Program (863 Program) and the National Basic Research Program will support CCS related research and development.

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UK recent developments in CCS

- Recent announcement of competition for full scale CCS demonstration. Further details to be released shortly in the forthcoming Energy White Paper.
- Supported by the Carbon Abatement Technology (CAT) Strategy, up to £30M for demonstration projects, Regulatory Task Force on CCS, Marine Bill.

UK CCS Work Streams – International

- (UNFCCC)
  - Kyoto Protocol: status under the Clean Development Mechanism (CDM)
  - Adoption of IPCC 2006 Inventory Guidelines for CCS
- Progressing CCS status under the International marine conventions
  - London Convention (Successful November Amendment)
  - OSPAR Convention
- Carbon Sequestration Leadership Forum (CSLF)
- IEA
- International Collaboration
  - China – Near Zero Emissions Coal (NZEC)

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Developing the UK NZEC Initiative

- Process in 2006 to properly define scope of cooperation and undertake procurement process to select European and Chinese partners.
- Major event was NZEC workshop in Beijing on 4-5 July engaging 80 International experts with 100 Chinese experts to help update on status of technology and to define scope of NZEC work
- Scope has now been agreed and partners selected (April 2007). Formal kick-off planned for June.

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NZEC Project Structure

- **WP1 – Knowledge Sharing and Capacity Building**; websites, workshops, seminars, exchanges.
- **WP2 – Future energy Technology Perspectives**; future energy demand, existing and advanced power generation technologies.
- **WP3 – Case Studies for Carbon Dioxide Capture**; techno economic studies of capture options.
- **WP4 – Carbon Dioxide Storage Potential**; regional assessment and field selection for demonstration.
- **WP5 – Policy Assessment and Roadmap**; including legislative and regularity issues and socio-economic impacts.

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European Partners

Consortium led by **AEA Energy and Environment** (Keith Bernard).

Consortium members are:

Air Products, ALSTOM Power, Doosan Babcock, British Geological Survey, BP, Shell, Cranfield University, Imperial College, Heriott Watt University

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Chinese Partners

Implementation, Monitoring and coordination undertaken by the **Administrative Centre for China's Agenda 21 (ACCA21)**

Chinese partners are:

Tsinghua University (3E Research Institute, Tsinghua-BP Clean Energy Research and Education Centre, Dept of Environmental Engineering and Science), Zhejiang University, China University of Petroleum (Beijing and Huadong), North China Electric Power University

Institute of Engineering and Thermophysics, Chinese Academy of Sciences (CAS), Institute of Geology and Geophysics (CAS), Institute of Policy and Management (CAS), Energy Research Institute (NDRC), TPRI, DCE, DTE

GreenGen, PetroChina, Jilin Oilfield, China United Coalbed Methane Co.

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Next Steps

- Further development work leading to a kick off workshop in late June in Beijing and full contractual sign off.
- EC-China-UK Steering Committee to meet early October, to be followed by a joint COACH and NZEC meeting also planned for October 2007 in Paris.
- NZEC outputs to be presented in late 2008/early 2009.
- Outputs from Phase 1 will be important in determining further activities in Phases 2 and 3.

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Thank you for your attention!

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