UNIVERSITY OF EDINBURGH
Business School

UK-China (Guangdong) CCUS Centre
中英（广东）CCUS中心

中国能建广东院
ENERGY CHINA GEDI

UKCCS
RESEARCH CENTRE

SCCS

華潤電力
CR Power

linkschina
领先财纳

Introduction to UK-China (Guangdong) CCUS Centre Activities

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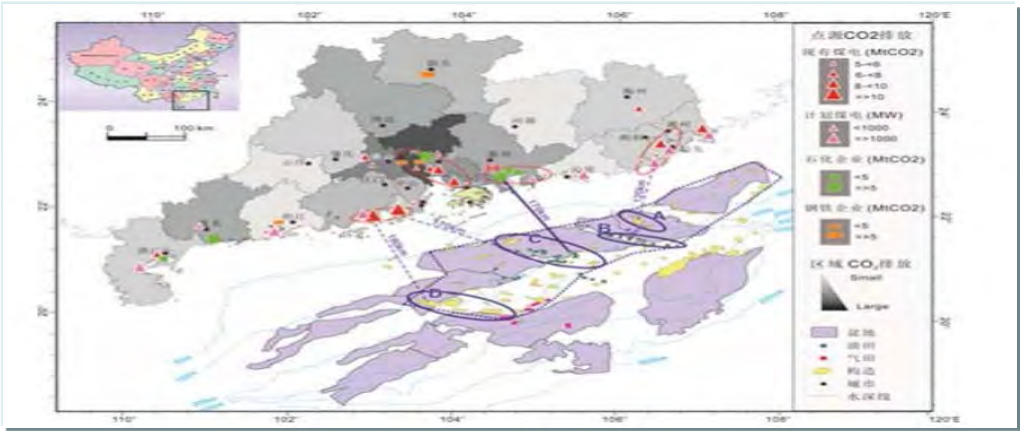
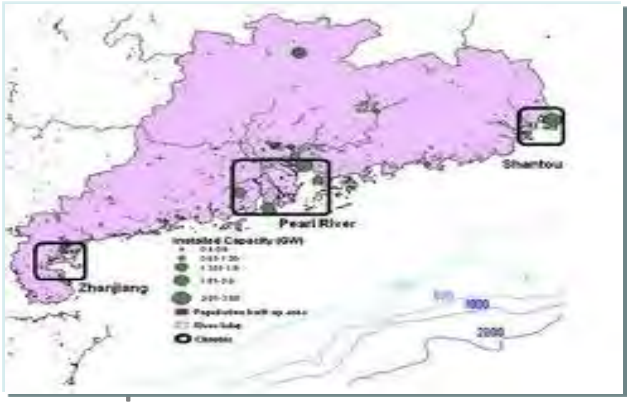
Presentation for UKCCSRC CPD course, 9/Sep/2014

Content

1. Background
2. CRP Haifeng CCS Project
3. UK-China (Guangdong) CCUS Centre

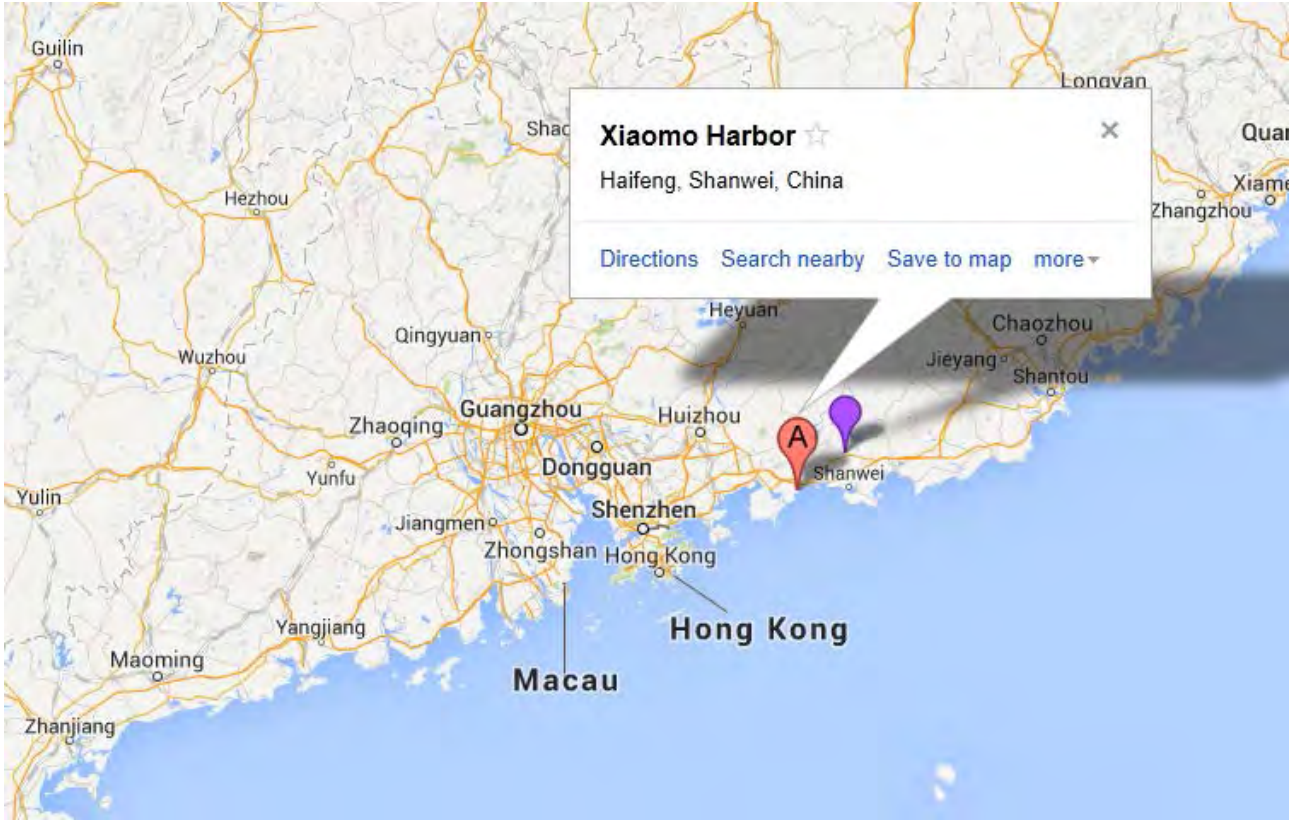
Past CCS Studies in Guangdong
过去广东的CCS研究项目



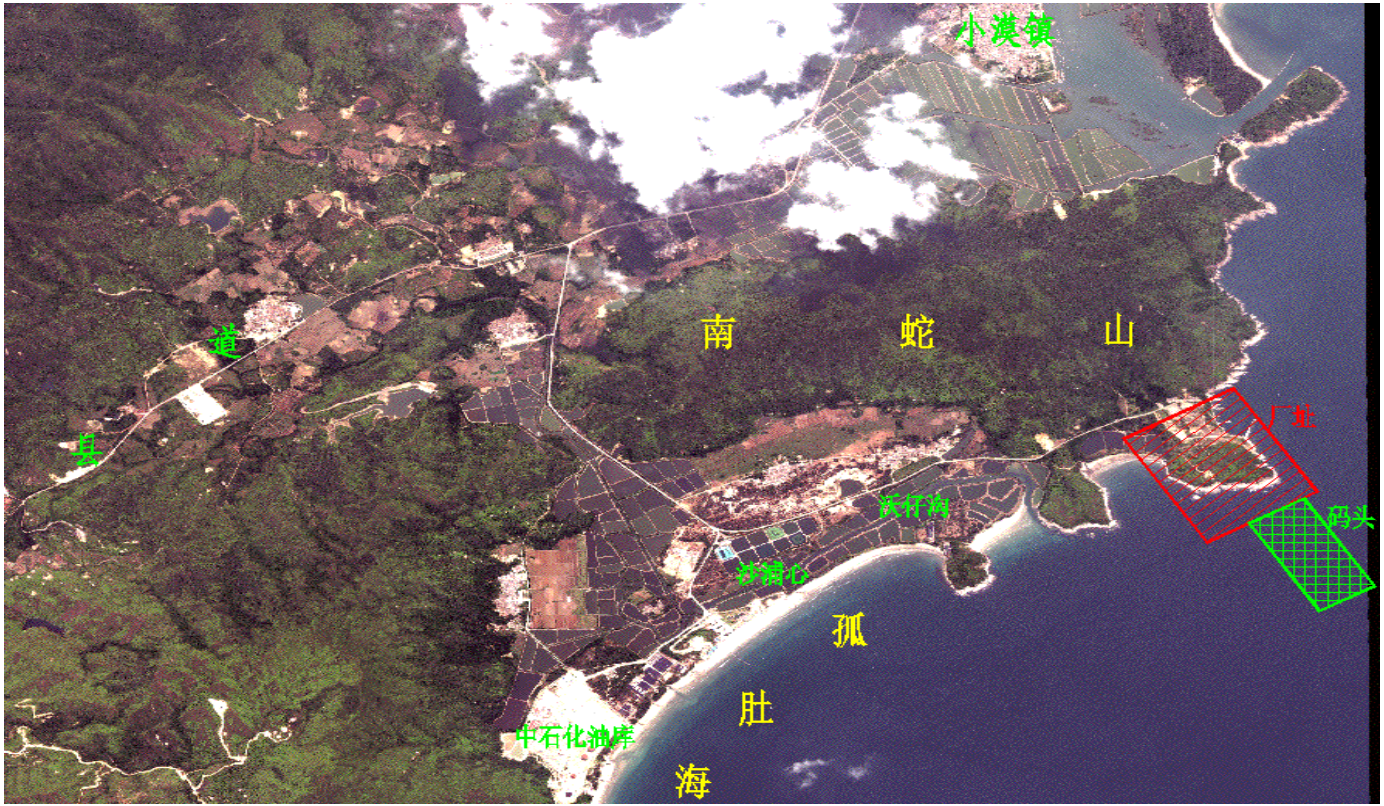


- Started to engage with stakeholders in 2006
- 2010-2013 GDCCSR Study implemented by UoE, Cambridge, Chinese Academy of Sciences Institutes and Linkschina, funded by UK FCO and GCCSI
- Identified storage capacity in South China Sea
- Suggested a roadmap
- Recommended a potential demonstration project

China Resources Haifeng Power Plant Location (1)
华润海丰项目位置（1）



China Resources Haifeng Power Plant Location (2)
华润海丰项目位置（2）



Aerial view of China Resources Haifeng Power Plant
华润海丰电厂鸟瞰图

Why Develop Demonstration Projects?
为什么开发示范项目

- Guangdong is a pilot low-carbon province, CCUS is the essential technology to decarbonise fossil fuel power plants, and satisfy Guangdong's energy need and protect ecological environment, in addition …
- Demonstrate innovative low-carbon technologies for China, increasing international competitiveness and influence
- Essential to give the UK-China (GD) CCUS Centre world-class experience to be able to work on the next stage of CCS projects in Guangdong, the rest of China and abroad

Project Overview (unit 1 and 2)

- China Resources Haifeng Power Plant was built by China Resources Power Holding Limited, it's China Resources' first power generating unit power project with megawatt capacity invested in Guangdong, site located in Xiaomo town, Haifeng contry, Shanwei city, Guangdong province, planned total capacity are 4×1000MW+4×1000MW units, construction in phase.

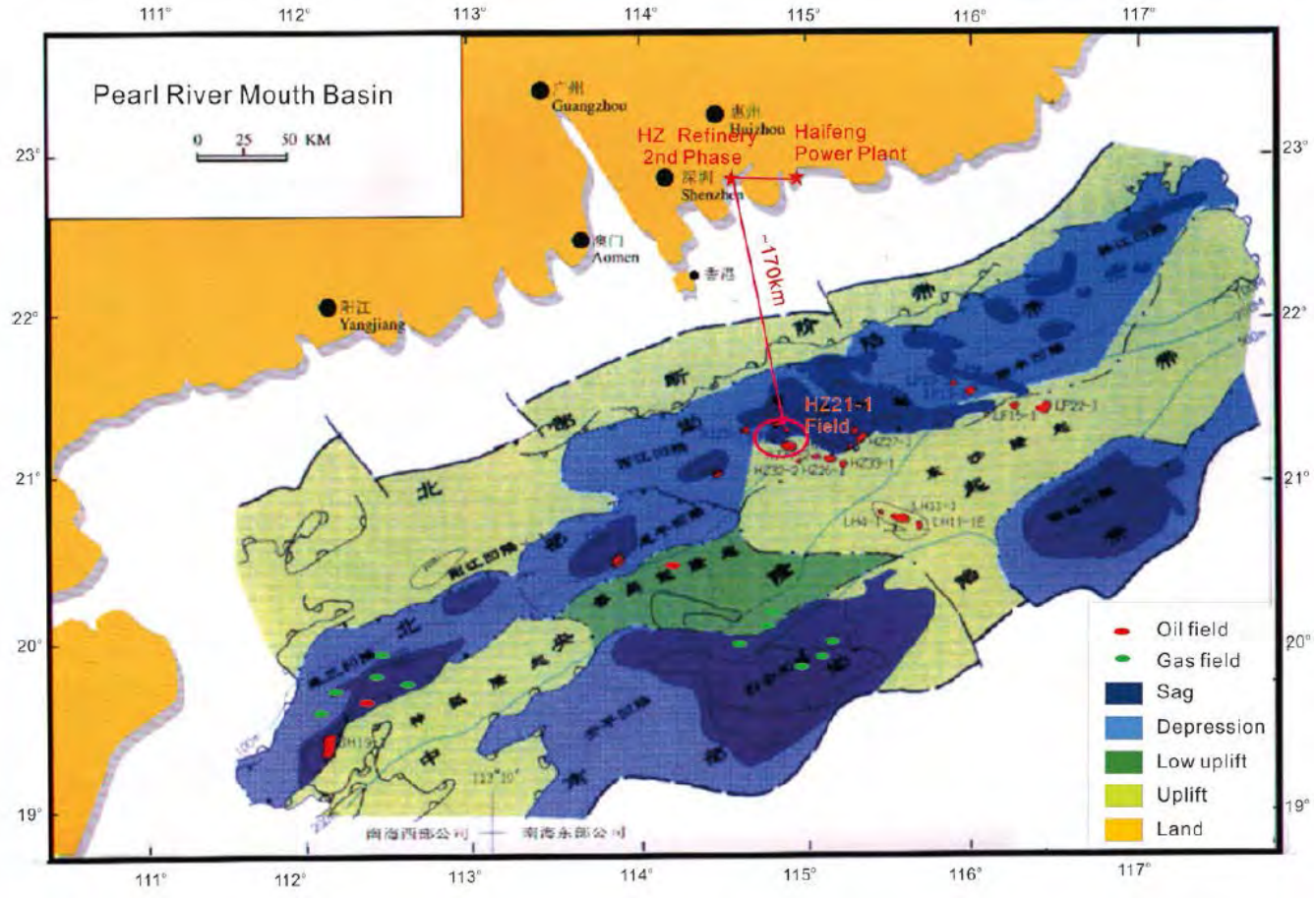
- Phase 1 units 1 and 2 are 2×1000MW ultra-supercritical coal-fired power units, and will construct a 100,000 tons dedicated unload coal wharf, total investment around 8.3 billion RMB, approved by National Development and Reform Committee on 13 July 2011, and started construction in Oct 2011, currently under construction, two units plan to put into operation by Dec 2014 and April 2015.

Project Overview (unit 3 and 4)

- To significantly accelerate the ecological civilization construction and national low carbon province pilot work of Guangdong province, on 27 June 2013, People's government and Development and Reform Committee of Guangdong province, Guangdong's DRC held the first CCUS Demo project coordination meeting, in which it set up a integrated deployment and arrangement of CCUS Demo work.

- Based on the good reputation of China Resources Power and China Resources group in Guangdong, Guangdong's DRC approved China Resources as the leading organization for Guangdong CCUS demonstration, meeting clearly stated that China Resources Haifeng Power Plant Phase 1 Unit 3 and 4 2×1000 MW expansion project as the first CCUS Demo project in Guangdong, providing CCUS ready interface installation scheme in feasibility study stage.

Potential Future Large-scale Integrated CCUS Project



Recent studies by CNOOC identify more potential storage sites for selection

Current Progress 目前的进度

- Guangdong Electric Power Design Institute and University of Edinburgh completed the CCS ready design for unit 3 and 4.

- Guangdong development and reform commission approved China Resources as the leading organization for Guangdong CCUS demonstration, meeting clearly stated that China Resources Haifeng Power Plant Phase 1 Unit 3 and 4 2×1000 MW expansion project as the first CCUS Demo project in Guangdong, providing CCUS ready interface installation scheme in feasibility study stage.

- The demonstration development plan aims at capture at least 1 million tonne CO_2 (pre-feasibility study funding is secured and started on 16 May 2014, Jia Li (j.li@ed.ac.uk))

- China National Offshore Oil Corporation also started to engage for CO_2 storage preparation

- Establishing the UK-China joint testing centre for testing innovative technologies and training

Implementation Timetable in 12 months
近期执行时间表

- CCSR for 2 x 1 GW unit (Aug 2014)　　为3号及4号机组预留征地 （2014年 8月）

- 1 million tonne CO_2 capture demonstration development Plan (Pre-feasibility started, due to complete by May 2015)

  100万吨碳捕集示范项目发展计划 预可研已经开始，2015年5月结束

- UK-China Joint Testing Centre for Innovative CO_2 Capture Technologies, potential pilots for testing/experience/training (plan to start construction by Feb 2015)

  中英联合碳捕集测试基地, 正在紧锣密鼓筹建中，计划2015年2月前开工建设

Progress Review 进展回顾

China Resources Power Haifeng Project

华润电力海丰项目

- - CCSR for 2 x 1 GW unit 3 & 4 (a contract with Edinburgh and GEDI, the draft report is completed)
- 为3号及4号机组进行CCS预留的计划(与爱丁堡大学及广东省电力设计院合同已签署，草案已经完成)

- - 1 million tonne CO_2 capture demonstration development Plan (Pre-feasibility started)
- 100万吨碳捕集示范项目发展计划 预可研已经开始

▪UK-China Joint Testing Centre for Innovative CO2 Capture Technologies, potential pilots for testing/experience/training (Need Discussion)

- 中英联合近零排放技术测试基地, 正在紧锣密鼓筹建中

Pre-feasibility Study Works 预可研的工作

目前，广东潜在的大型一体化CCUS示范项目包括在华润电力捕集二氧化碳，二氧化碳的运输、二氧化碳的地质利用与盐水层封存，包括再利用中海油海上采油平台。预可研由李佳 (UoE) 和朱和平（CRP) 协调，包括以下5份报告:

Currently, the potential large-scale integrated CCUS demonstration project include China Resources Power CO2 Capture, Transport, Utilisation and Saline Aquifer Storage, including studying the feasibility of reusing existing oil and gas platforms. The study is coordinated by Dr Jia Li and Mr Heping Zhu, Including five reports:

报告 1：华润海丰项目碳捕集改造预可研（2014年10月）
CRP CO2 Capture Retrofit Feasibility Study

报告 2：中海油某海上采油平台再利用项目技术预可研报告（2014年11月）
CNOOC offshore oil platform reuse technology feasibility study

报告3：广东二氧化碳地质利用潜力和项目机会（2014年11月）
CO2 Geological Utilisation Potential and Project Opportunities

报告4：惠州-海丰CCUS集群项目方案（2014年12月）
Huizhou-Haifeng CCUS Cluster Programme

报告5：广东示范项目的推广，提高国内外对广东CCUS发展和示范机会的认知（2015年3月）
Capacity Building and prormote awareness of Guangdong CCUS Project

Pre-feasibility Study Works 预可研的工作

- 活动1：研究华润海丰项目CO2捕集改造方案（2014年10月）
- **1.1 华润海丰项目碳捕集改造的技术选项**
- **1.2 华润海丰项目碳捕集改造的技术经济评估**
- **1.3 华润海丰项目二氧化碳捕集改造的预可研**

- 活动2：调查再利用某海上石油生产平台的技术可行性（2014年11月）
- **2.1 场地封存量评价**
- **2.2 海上平台评价研究**
- **2.3 油井评价研究**
- **2.4 综合技术经济评估**

- 活动3：研究广东省CO2地质利用机会（2014年11月）
- **3.1陆上CO2 提高石油和天然气采收率潜力**
- **3.2 海洋CO2提高石油采收率潜力**

- 活动4：开发惠州-海丰地区CCUS集群计划（2014年12月）
- **4.1确定潜在的运输途径**
- **4.2 连接海丰-惠州CCUS示范项目和其他大型排放源**
- **4.3开发惠州-海丰CCUS集群**

- 活动5：通过网络，报告，和杂志推广和提高国内外对广东CCUS发展和示范机会的认知（2015年3月）

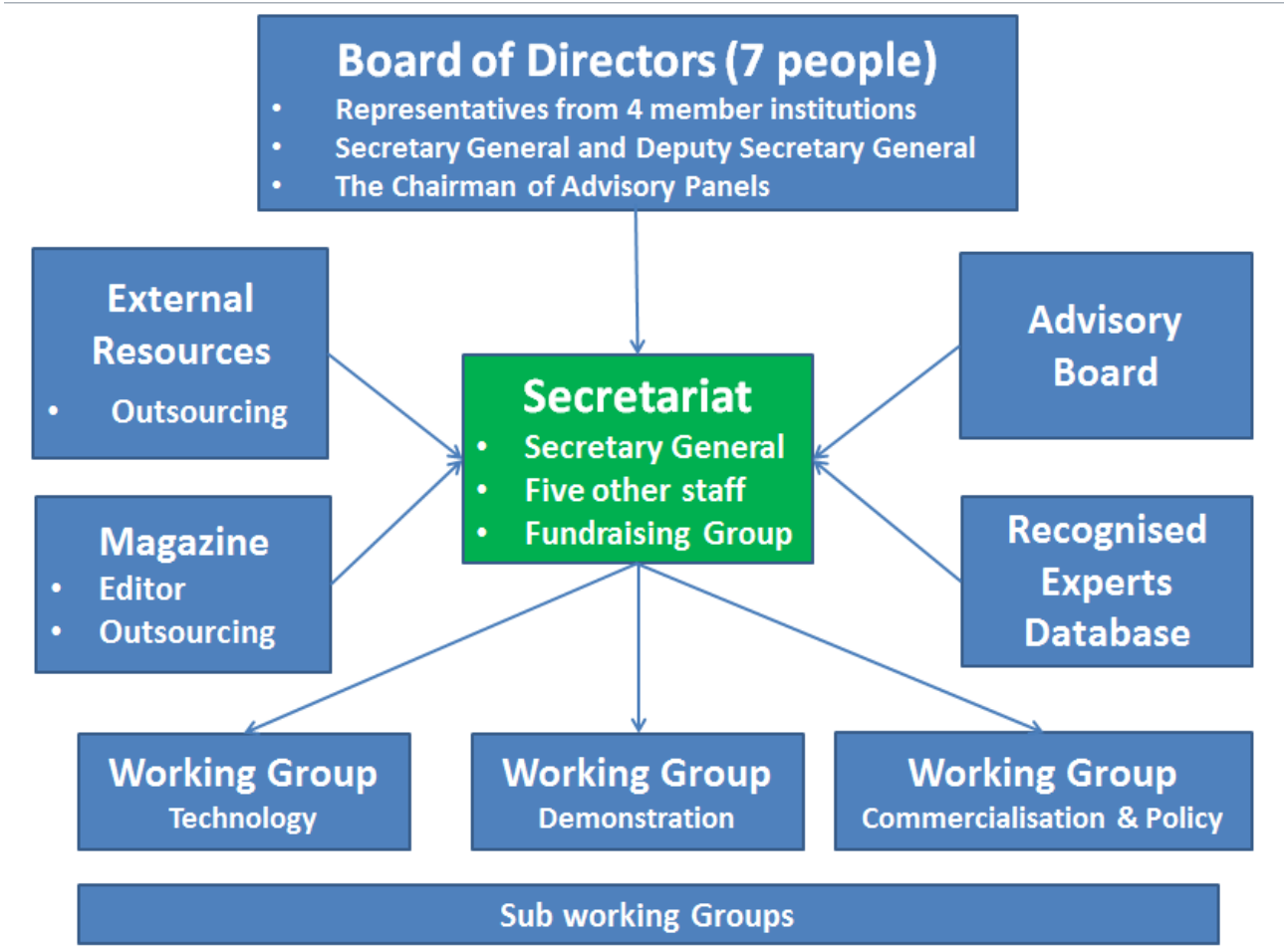
MoU signed at Lancaster House, London, witnessed by Mr Gregory BARKER and Mr ZHU Xiaodan

Centre Plate Awarded by Chief Climate Negotiator Minister Xie Zhenhua and Guangdong Deputy Governor Xu Shaohua (19/Dec2013)

About the UK-China (Guangdong) CCUS Centre
中英（广东）CCUS中心简介

- Support the development of large-scale demonstration project
- Develop the UK-China joint innovation platform
- Establish working groups (and programs)
  - Technology (Capture, Transportation, Storage, Best Practice)
  - Demonstration (CRP Project, Coal SNP Project in Identification)
  - Policy and finance (Financing, Communication and Stakeholder Engagement)
  - Manufacturing Working Group (NEW)
- Appoint the international advisory board to support working groups and center operation
- Communicate with key stakeholders (magazine, website, workshops, specific meeting)
- Support academic and industry collaborations in oil and gas, clean fossil fuel

1. **Board of Directors** (to replace the existing management committee)
2. **Secretariat** (incl. project application, project management, conference organisation, webpage management, contract approval and negotiation, outsourcing accounting and auditing)
3. **Working Groups** (composed by experts from different members)
4. **Advisory Panels**
5. **Institutional Members**
6. **Recognised Individual Experts**



Progress & Agenda

- China Resources Haifeng Project (a long lead time before it could start construction)

  - CCSR for 2 x 1 GW unit (draft report completed)

  - 1 million tonne CO_2 capture demonstration pre-feasibility study (seeking financial support from GD DRC, UK FCO, Scottish Government, and CRP)

  - joint innovation platform (seeking financial support from ADB, RCUK, DECC, MOST and CRP)

- CNOOC

  - Offshore transportation and storage study (started the first meeting in Feb 2014)

- Near Zero Emission Magazine (the second pilot issue is coming)
- The 2st UK-China (Guangdong) CCUS Expert Workshop (held on 15May 2014)
- Centre Development

- Governance
- Secretariat
- Rules for New Members

The Side Benefits of Demonstrating CCUS – Centre needs Creating Momentum for Million Tonne CCUS Project in Guangdong

- Near Zero Emission Technologies (e.g. Flue Gas Wet ESP, Coal SNG, Coal Water Slurry)
- Manufacturing industry
- Enhance offshore engineering capacity
- International collaboration model
- Establish effective communication for infrastructure projects
- Pilot very strict IPR protection environment
- Very rigid quality control
- Potentially International Co-financing Mechanisms

Centre Office Building

Acknowledge Support for UK-China (Guangdong) CCUS Centre
谢谢对中英（广东）CCUS中心的支持

广东省发展和改革委员会

英国驻广州总领事馆

Department of Energy & Climate Change

The Scottish Government

Scottish Enterprise

中国能建广东院 ENERGY CHINA GEDI

UKCCS RESEARCH CENTRE

SCCS

linkschina 领先财纳

中国科学院南海海洋研究所

中国科学院广州能源研究所

華潤電力 CR Power

cnooc

Howden

ALSTOM

Shell Cansolv

DNV·GL

CIMC

华润集团简介(China Resources Group Introduction)

- 华润集团是由国务院国资委直接监管、关系国计民生的53家国有重点骨干企业之一，总部设在香港。
- 华润在香港拥有5家、在内地拥有6家上市公司，其中，华润创业、华润电力、华润置地位列香港恒生指数成份股。
- 【财富】世界500强企业排名中，华润集团名列第187
- 自2005年起，华润集团连续被国资委评为A级中央企业。
- China Resources Group is one of the 53 state-owned key enterprises, directly supervised by the state council and highly related to the national economy and the people's livehood, headquarter set in Hongkong.
- China Resources Enterprise, Limited, China Resources Power Holdings Company Limited and China Resources Land Limited under the management of the Group are listed as Hang Seng Index constituent stocks.
- China Resources is ranked the 187th of the Global 500 by latest Fortune ranking.
- Since 2005, China Resources has been continuingly rated as a A grade central enterprise by Sate Asset Regulatory Committee.

华润电力简介(Introduction to China Resources Power)

华润电力控股有限公司成立于2001年8月27日，是华润集团旗下的香港主板上市公司（HK0836），也是香港恒生指数成分股（蓝筹股）成员，主要从事投资、开发、运营和管理发电厂 ，并投资、经营、管理与发电主业相关的煤矿项目及物流体系。

截至2012年底，公司总资产达1777亿港元，旗下共有70间运营电厂，权益装机容量为2568万千瓦，可控煤炭产能约3352万吨/年。

Established on 27 Aug 2011, China Resources Power is a Main Listed company under China Resources Group in HK and a member of HK Hang Seng Index constituent stocks (blue chip). The company's major business involves investment, development, operation and management of power plant, and invest, operate, manage power generating related coal mine project and logistics system.

By the end of 2012, Company has HKD 177.7b total assets, in total 70 power plants, with total equity capacity 25.7GW, control 33.5 million tonne coal production capacity.