U.S.-China Fossil Energy Protocol
Annex II

Cooperation in the Area of Clean Fuels
Presentation to Permanent Coordinating Group

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San Francisco, CA
August 26, 2010
Presentation Outline

Introduction and Accomplishments

Samuel Tam

2011 Plan & Beyond

Deshun Liu
Objectives: Jointly investigate and discuss key factors, analyses, data, processes, and technologies leading to the preparation and utilization of coal as:

- An environmentally acceptable and economic resource for production of alternative transportation fuels, additives, and chemicals
- A preferred feedstock for production of power
- A source of energy and feedstock for the industrial sector
Status

- Protocol signed – April 20, 2000
- Protocol renewed – April 20, 2005
- Annex II signed – November 19, 2002
- Annex II renewal – September 2009
Accomplishments
Accomplishments

• July 2002: Discussions initiated between WVU, Shenhua, and DOE/NETL

• December 2003: MOU between WVU and Shenhua
  – Two objectives:
    • Promote joint research on economic and environmental impacts of coal liquefaction in China
    • Encourage technical collaboration on coal and energy projects between WVU and Shenhua
  – MOU still in effect
Accomplishments

- December 2006: Expand Annex II to cover CCS for coal conversion plants
- 2007: Initiate pre-feasibility study on CCS for the Shenhua DCL plant
- July 2008 draft pre-feasibility prepared and presented in Beijing
- December 2008: Shenhua DCL plant start-up
- August 2009: Pre-feasibility study finalized and initial meeting for follow-on, feasibility study outlined
Accomplishments

• April 2010: Kick-off meeting for feasibility study on carbon sequestration at the Shenhua DCL plant in Inner Mongolia
  – Coordination with Shenhua and Peking University on geological data collection and analysis
  – Assist with Shenhua’s plans to proceed with a 100,000 ton CO$_2$ injection demonstration for geologic storage (December 2010)

• FY2010: Begin collaboration with China Coal and Lu’an Group on coal-biomass pyrolysis and co-gasification and F-T synthesis
Accomplishments

- **US-China Clean Energy Workshops**
  - US-China Clean Energy Workshop, Morgantown, WV Oct. 17-18, 2004 (about 80 participants)
  - US-China Coal Gasification and Liquefaction Technology Workshop, Beijing, June 15-16, 2006 (about 150 Participants)
  - US-China Coal Conversion and Carbon Management Workshop, Morgantown, WV. Dec. 2-4, 2009 (about 120 participants)

- **Training programs for the Chinese coal and energy sectors at WVU**
  - MBA training program (a few Chinese officials every year)
  - Fly ash utilization program (NDRC delegation ~ 20 participants), Nov. 2009
  - Mine safety training (25 participants), Sep 2007
  - Coal industrial development training (21 participants) Jan. 2002
Accomplishments

• World’s first commercial-scale DCL plant began operations
• Proceeding with study for CCS pilot-scale injection test
• Plans to expand study to regional scale
• Numerous site visits held in both countries
• Initiating new activities with other organizations on areas of mutual interest (CCS, coal-biomass)
Annex II Renewal, Qingdao, China, September, 2009
Future Plan of Annex II

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10th Anniversary Celebration of the U.S.-China Fossil Energy Protocol
August 25-26, 2010. San Francisco
Continue Current Activities

• Regular communication between DOE and NEA

• US-China Clean Energy Workshops
  – Coal conversion and CCS workshop
    China in 2011

• Joint Research in Clean Coal Technologies
Continue Current Activities

• Training for Chinese officials
  – Training for Chinese provincial Energy Policy officials
  – Management training for the Chinese energy sector
  – Technical training for: mine safety, land reclamation, CO2 management and clean coal technology

• Encourage business collaboration between US and China energy companies
Continue Current Joint Research

• Shenhua—WVU Joint Research
  – Long term economic and environmental analysis of Shenhua DCL plant
  – CO2 sequestration associated with Shenhua DCL plant
  – Study on integrated DCL and ICL process
  – Use CO2 from Shenhua DCL plant for algae production test
  – Modeling CO2 behavior in deep saline water (Shenhua deep wells)
  – Role of hydrogen from coal as an energy source

• ChinaCoal—WVU joint research on coal-biomass pyrolysis and gasification

• Luan Group—WVU joint research on synthesis technology from coal-biomass derived syngas
New Proposed Collaborations

• Pre-feasibility study of Oxyfuel power plant (300MW) and related CO2 sequestration in Shanxi by Shanxi International Energy Group (SIEG), Air Products and WVU

• Explore possibility to develop CTL in WV by Chinese and US companies

• Develop educational exchange on energy between US and China universities

• Collaboration between WVU and Shuozhou city government