Status and prospects of the Capture Programme
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Programme Overview
The CO2 Capture Project (CCP) is an award-winning partnership of several major energy companies working to advance the technologies that will underpin the deployment of industrial-scale CO2 capture and storage (CCS).

The CCP is currently in its third phase of activity:
• Phase 1 (CCP, 2001-2004) technology screening/proof of concept – completed
• Phase 2 (CCP, 2004-2009) intensive development – completed
• Phase 3 (CCP, 2008-2013) demonstration – on going

PCO2C Partnership
• Pilot plant testing of novel post-combustion technology at the Energy & Environment Research center of the University of North Dakota (EERC)
• Programme conclusion by December 2012
• Specific focus on application to natural-gas fired power stations
• Extended testing of selected technology specific for the CCP during the first quarter of 2013

About the CCP
The CO2 Capture Project (CCP) is an award-winning partnership of several major energy companies working to advance the technologies that will underpin the deployment of industrial-scale CO2 capture and storage.

For further information on the work of the CO2 Capture Project, please visit: www.co2captureproject.com

Main R&D Projects in CCP

Oxy-fired burners for process heaters
• CFD simulation and pilot testing of conventional John Zink burners operated in oxy-firing mode.
• Project concluded June 2012
  Main results:
  • Heater efficiency increases by 4 (air-preheat) to 15 (no air pre-heat) % points up to 93%
  • Conventional burners may work similarly in oxy-combustion mode
  • NOx formation strongly decreased
  • High air ingress due to negative operating pressure

Membrane Water Gas Shift
• Intensive testing of Pd-alloy membrane tubes and modules developed by Pall
• Construction of base module for a field pilot unit
• Sizing and coating of pilot and commercial unit for refinery application in view of a carbon-free hydrogen-fired refinery

Oxy-fired Technology Demonstrations

Fluid Catalytic Cracking Regenerator
• Pilot FCC unit
  • Location: Sao Mateus do Sul (Brazil)
  • Size: 33 bbl/day of feed (~200 times larger than conventional FCC pilot units)
  • Retrofit to oxy-firing included installation of:
    • Oxygen supply system
    • CO2 recycle system
  • Test duration: September 2011/September 2012
  • Main results:
    • Demonstrated that FCC may work steadily in oxy-firing mode
    • CO2 concentrations > 93% vol. achieved in the flue gas
    • Corrosion problems in the flue gas recycle system identified and solved
    • In oxy-firing mode the unit capacity may be increased by ~10%
    • Economic evaluation confirmed that oxy-firing is competitive with post-combustion for this application

Once-Through Steam Generator
• Partnership including Canoeus Energy, Devon Canada, MEG Energy, Praxair and Statoil
• Co-funding by the Climate Change and Emission Management Corporation of the Province of Alberta
• 50 million BTU/hr commercial OTSG unit owned by Canoeus Energy in Christina Lake (Canada) is going to be retrofitted to oxy-firing
• Feasibility study concluded in 2011
• Retrofit detailed design ongoing
• Installation of oxygen supply system, flue gas recycle system and burner modifications by April 2013
• Test run by June 2013

Chemical Looping Combustion
• Next generation technology for heavy oil and potential breakthrough in capture cost
• Developed with CCP co-funding in previous phases to 120 MW unit with Ni-based carrier
• CCP3 is supporting work by several institutions in view of:
  • Verifying the potential of Cu-based carriers as a cheaper alternative to Ni-based carriers
  • Designing and costing demo unit (10 MW) and commercial unit for heavy oil extraction

Three areas for application of capture technologies
Oil Refining
• Responsible for 6% of total emissions of CO2
• Up to 4 million tons/year from single refinery
• Multisource/multistack environment:
  • Fluid Catalytic Cracking (FCC) unit
  • Hydrogen production
  • Boilers and process heaters

Heavy Oil Extraction
• Extraction technique by steam injection (SAGD) produces fuels with 20% higher footprint than conventional sources
• Major source of future growth for GHG emissions in producing countries (e.g. Canada)
• Once Through Steam Generators (OTSG) are the typical boilers used in SAGD operation

Natural Gas Power Stations
• Power generation from natural gas is widely used by oil & gas companies
• Current low cost of gas in North-America should increase the share of power from gas
• Low concentration of CO2 in the flue gas (4% vs. 12% typical of coal combustion) makes capture more difficult

Economics Team
Comms Team
Policy Team
Technology Providers
Capture Team
Storage Team
CO2 recycle system
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