



Flue Gas CO₂ Capture from Power Stations: Private Sector Response to the Global Warming Issue

G8 IEA/CSLF

Assessment Workshop on CCS Near Term Opportunities

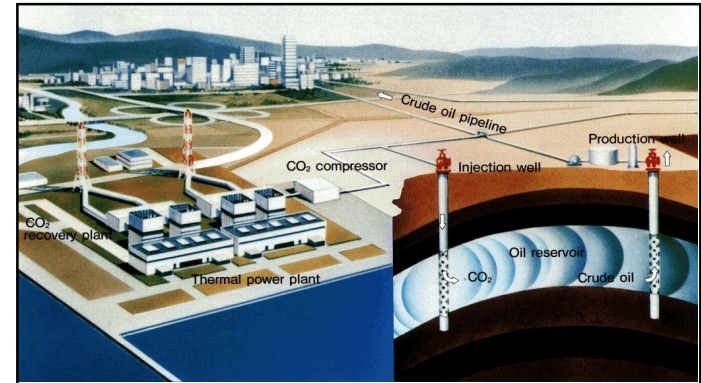
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- ◆ The issue of Climate change is now in the homes and businesses of communities throughout the world
- ◆ 2 Main Global Issues we must address
 - Global Warming (CCS from fixed emissions sources)
 - Peak Oil (EOR to secure energy reserves)
- ◆ Developing CCS Projects
 - Must assess the market needs
 - Projects must be profitable – commercial operation
 - CO₂-EOR can be cost feasible – important first step
- ◆ Early mover opportunities in CCS
 - Q: How can the private sector respond to the issue of global warming and contribute to CCS?
 - A: If the project is profitable, the private sector will react



Concept of CO₂ capture and EOR



CO₂ capture Plant (450 t/d)

Important steps to realize CCS success

1. **First Step** – Early Opportunity – ‘Domestic’ CO₂-EOR

- ◆ CCS projects must be cost effective – site selection is critical
- ◆ CO₂-EOR provides economic incentive for project implementation in key markets (US, North Sea and Middle East)
- ◆ Large scale demonstration CCS projects leads to public acceptance, economies of scale and increased overall confidence

2. **Second Step** – ‘International’ CO₂-EOR / Aquifer Storage

- ◆ The first step is important to prove CCS can work at large scale
- ◆ International CO₂ transport (by ship) to EOR markets (E.g. Japan to the Middle East) – requires International collaboration
- ◆ Widespread global geological storage of CO₂ in suitable aquifers

1



Malaysia
 Petronas
 Steam
 reformer
 1999~
 200 t/d
 Urea

2



Japan
 'A' Chemical Co.
 Nat. gas & oil
 2005~
 330 t/d
 General use

3



India
 IFFCO
 Nat. gas
 Dec 2006~
 450 t/d (x 2
 units)
 Urea

CO₂ Recovery (CDR) Plant -
 IFFCO Aonla Unit (India)



DEMO PLANT OUTLINE

Client: Power Station, Japan
Solvent : KS-1
Capacity : 10 T/D
Feed Gas: Coal Fired Boiler (14.1 v% CO₂)
Start-up: July 2006
Location: Nagasaki, Japan

Development Results

- ◆ Increased understanding of the effects of impurities on the system (dust, SO_x, NO_x, etc.)
- ◆ Identifying and incorporating countermeasures for each impurity
- ◆ >4,000 hours of operation and experience
- ◆ Test results will facilitate scale up CO₂ capture for coal fired boilers

Large Scale CO₂ Capture Plant (3000 T/D Plant)



How can we realize near term CCS opportunities?

- ◆ Government, along with the private sector must continue to promote CCS
 - If the Government establishes mechanisms, policies & programs which are economically attractive, the private sector will take action
 - Govt. support for large scale CCS demonstration projects
 - Govt. to provide industry incentive (tax levies/subsidies)
 - Work to build a baseline CCS infrastructure – CO₂ trunk pipeline for key EOR areas - North America, North Sea & the Middle East.
 - Develop a world-wide Emission Trading Platform and ensure CCS is part of this – This will help drive emission reduction market mechanisms

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http://www.mhi.co.jp/mcec/product/recov_co2/