The role of CDM in Carbon Dioxide Capture and Storage

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Brief Introduction to the CDM

• Non-annex parties to the Kyoto Protocol (countries such as Saudi Arabia) can generate Certified Emission Reductions (CERs) through greenhouse gas (GHG) emission reduction projects

• GHG emission reduction project must be registered with the CDM EB in order to be eligible to receive CERs

• The application process is onerous and project developers usually work with CDM experts to achieve project registration

• CERs can be sold on the market to Annex 1 countries (current prices range from about US$5 – US$20 per CER (1 tCO$_2$e))

• Buyers include private companies, international institutions and governments in countries such as EU 15, Japan, etc.
A First CCS Methodology Submitted to EB

- Project developers must complete a Project Design Document (PDD) as part of the process in achieving registration of an GHG emission reduction project

- The PDD is prepared based on an accepted methodology for the project type. If an accepted methodology does not exist, a new methodology submission must be prepared

- A CCS methodology application, prepared by Mitsubishi UFJ Securities, was submitted to the CDM Methodology Panel for Round 13 in September 2005. This was a world first.

- The CDM EB, at its 22\textsuperscript{nd} meeting, decided that the eligibility of CCS projects as CDM project activities, would require a COP/MOP decision. This decision is still pending.
CDM Eligibility Issue – Latest Developments

- The CDM Secretariat has compiled submissions made by the Parties on Project boundary, Leakage and Permanence

- “Report on the workshop on CCS as CDM project activities” (which was held in conjunction with SBSTA) is available on the UNFCCC website

- The Meth panel is finalizing recommendations for the CDM EB on CCS CDM methodology issues (to be considered at EB 26)

- The above documents will be considered at COP/MOP2 and a decision should be forthcoming on the eligibility issue
Different types of CCS projects and the CDM

• Two main types of CCS projects which may be eligible for the CDM in the future:
  - geological CCS projects which store anthropogenic CO\textsubscript{2} in deep saline reservoirs or spent oil/gas reservoirs
  - geological CCS projects which store anthropogenic CO\textsubscript{2} in producing fossil fuel reservoirs e.g enhanced oil recovery (EOR)

• Oceanic storage of anthropogenic CO\textsubscript{2} is unlikely to be eligible for the CDM anytime soon

• Chemically fixing CO\textsubscript{2} is still in the research stage and unlikely to be economically feasible in the foreseeable future, even if the CDM is utilized
A Typical Anthropogenic CCS Project

Source Plant/Factory → CO₂ capture → CO₂ compression and dehydration → Injection well → Reservoir → Reinjection of CO₂

B → E → D

Associated gas removed → Flaring of waste gas → Natural gas and NGL

CO₂ separated from the crude oil → Crude oil tank → Production well → Flaring of waste gas → Transportation of oil via pipeline

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Methodological Issues

• Once CCS projects are ruled eligible as CDM project activities, the Meth Panel will be able to consider (and provide recommendations) on new CCS methodology applications

• Baseline determination will be different for those CCS projects with retrofitted (CO$_2$) source plants as compared to those with Greenfield source plants

• Additionality demonstration is no different to that of normal CDM projects

• Permanence is the most important single issue (both short-term during the project crediting period, and long-term)

• Most CCS experts now agree that appropriately selected sites are unlikely to seep (injected CO$_2$)
What’s needed before registering CDM CCS projects

• An accepted methodology which is applicable to your CCS project type

• A fully completed PDD which is validation ready

• A DOE who is approved by the CDM EB to validate CCS projects

• Host (non-annex 1) and annex 1 country approval

• Capacity for CDM Registration and Issuance Team (RIT) to access the PDDs for CCS projects

• Before ERs can be verified, need at least 1 other DOE which is approved for the CCS sectoral scope

• The more the current CDM framework needs to be modified for CCS, the longer it will take for the first project to be registered
Why bother with the CDM?

• May seem very onerous at first but already 276 registered projects with over 11.1 million CERs issued

• CCS projects associated with enhanced fossil fuel production can increase IRR through income from CERs

• CCS projects which have no income source (from fossil fuel sales) can confirm an income stream through the sale of CERs

• The CDM can help to attract debt / equity investors to finance the CCS project

• Good as a means to promote Corporate Social Responsibility (CSR) for both the CER generator (seller) and buyer
Example – Large CCS Project with Oil Recovery

**Financial Details**

Phase 1 – Initial total investment cost  \( 492 \times 10^6 \text{US$} \)
Phase 2 - Initial total investment cost  \( 985 \times 10^6 \text{US$} \)
Average crude oil sales/yr  \( 415 \times 10^6 \text{US$} \)
Start of Phase 1 2009
Start of Phase 2 2012
Project life 15 years

**Expenses**

Average O&M costs/yr  \( 190 \times 10^6 \text{US$} \)

**Project IRR** 13.2%
IRR of CCS Project with CER Revenue

**Amount of CERs/yr**
- Total after Phase 1: \(1.6 \times 10^6\)
- Total after Phase 2: \(5.4 \times 10^6\)

**Equity IRR of Project**
- Without CER revenue: 13.2%
- CERs @ 10 US$: 21.7%
- CERs @ 15 US$: 26.0%
- CERs @ 20 US$: 30.5%
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