



CO₂ Capture Project (CCP) Phase 3 ***Preparing for Industrial Deployment***

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The CO₂ Capture Project (CCP) is an award-winning partnership of seven 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 (CCP1, 2001-2004) technology screening/proof of concept – **completed**
- Phase 2 (CCP2, 2004-2009) intensive development – **completed**
- Phase 3 (CCP3, 2009-2013) demonstration – **on going**

The CCP is funded primarily by:

- Member and associate member contributions
- Government grants
- In-kind contributions

CCP3 project members are:

BP (Program Operator), Chevron, ConocoPhillips, Eni, Petrobras, Shell, Suncor and associate member EPRI.

Program Objectives

In order to help make CCS a practical reality, in reducing emissions from power plants and heavy industrial processes such as oil and gas refining and gas processing, the CCP aims to accomplish the following goals:

- **Increase technical and cost knowledge** associated with CO₂ capture technologies and confirm that geological storage of CO₂ is a secure and viable means of reducing greenhouse gas emissions
- **Reduce CO₂ capture costs by 20-30%** by supporting the development of improved technologies
- **Quantify remaining assurance issues** surrounding geological storage of CO₂ through site assessments, field surveys and numerical approaches; and rapid dissemination of results to stakeholder groups
- **Validate cost-effectiveness of monitoring technologies** with design and testing of emerging and integrated systems
- **Cooperate with interested parties to share information** about both capture and storage demonstrations

The project consists of four work teams, supported by Economic Modeling:

- **Storage Monitoring & Verification (SMV):** increasing understanding and developing methods for safely storing and monitoring CO₂ in the subsurface
- **Capture:** aiming to reduce the cost of CO₂ capture from a range of refinery, in-situ extraction of bitumen and natural gas power generation sources
- **Policy & Incentives:** providing technical and economic insights needed by stakeholders, to inform the development of legal and policy frameworks
- **Communications:** taking rich content from the ongoing work of the other teams and delivering it to diverse audiences including: government, industry, NGOs and the general public
- **Economic Modeling:** building a fuller picture of the integrated costs for CCS

- **Storage Assurance:** Address key storage containment and efficiency issues
 - **A. Well Integrity:** Surveys (logging, sampling / analysis) and forward simulation to understand the rate and extent of alteration processes and impact on long-term containment
 - **B. Subsurface Processes:** Specialized field and experiment work to document physico-chemical processes impacting storage efficiency and security; Protocols for Krel & Pc
 - **C. Monitoring & Verification:** Multi-organizational retrospective on the cost-effectiveness of previous deployments; Development of a modular borehole design
 - **D. Storage Optimization:** Analytical and numerical solutions to pressure management, conduit flow and efficiency / economics; Certification Framework case studies
- **Field Trialing:** Deployment of emerging M&V technologies and in situ subsurface processes experiments
- **Stakeholder Issues:** Technical background for Communications and P&I Teams

Economic evaluation

- **State of the art New Baselines for CCP3**

- A detailed study by Foster Wheeler on capture of CO₂ from Once Through Steam Generators (OTSG's), Combined Cycle Gas Turbines (CCGT's) and refinery heaters, Fluid Catalytic Cracking (FCC's) and reformers using pre, post and oxy-firing technologies

Technology demonstration

- **Oxy-fired Fluid Catalytic Cracking (FCC) Pilot Plant demonstration**

- Vacuum Gas Oil & Atmospheric Residue Feeds

- **Oxy-fired Once Through Steam Generators (OTSG)**

- 50 MMBTU/hr OTSG retrofit

Development projects

- Capture of CO₂ from refinery heaters using oxy-fired technology
- Chemical Looping Combustion
- Membrane Water Gas Shift

Policy & Incentives

The Policy & Incentives team works to provide the technical and economic insights needed by stakeholders to inform the development of legal and policy frameworks.

CCP3 highlights include:

- **Regulatory update issued:** examining policy and incentive development, with a focus on the EU, US, Canada and Australia
- **Risk evaluation study:** the CCP has joined a consortium to put a financial value on the potential risks and damages associated with CCS

The Communications Team takes rich content from the ongoing work of the teams to deliver it in a relevant and understandable way to diverse audiences. Knowledge is shared using a range of channels including:

- **Technical conferences:** hosted knowledge sharing booth at IEA GHG-10 and US DoE NETL CCS Conference
- **Literature:** a range of communications material is produced and disseminated to key stakeholders including the CCP's popular *CCS In Depth leaflet*.
- **Website:** Information is shared via www.co2captureproject.com
- **Media:** The CCP contributes expert articles in key industry media publications

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