

CO₂ Capture Project

CO₂ Capture Project Update

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CO₂ capture & sequestration (CCS) in future international R&D programs. November 17th 2004

www.co2captureproject.org

CO₂ Capture Project

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CO₂ Capture Project

Introduction

- Background on CO₂ Capture Project
 - Cooperating for a better environment
 - Program structure
 - Project objectives
- Project Progress and Timeline
- Overview of CCP Findings
 - Capture
 - Geologic storage
 - Progress of other program areas
 - Policy, Technology Advisory Board and Communications
- CCP Phase 2: Outline of objectives and plans
- Conclusions



CO₂ Capture Project

Cooperating For A Better Environment



NETL US Dept. of Energy
 National Energy Technology Laboratory
David Hyman, Program Manager



EU DG Research
 Directorate-General Research
Program Manager: Dennis O'Brien



Norges forskningsråd
 The Research Council of Norway
Program Manager: Hans-Roar Sørheim



EU DG Energy and Transport
 Directorate-General Energy and Transport
Program Manager: Vassilios Kougionas

Joint Industry Partnership (JIP)



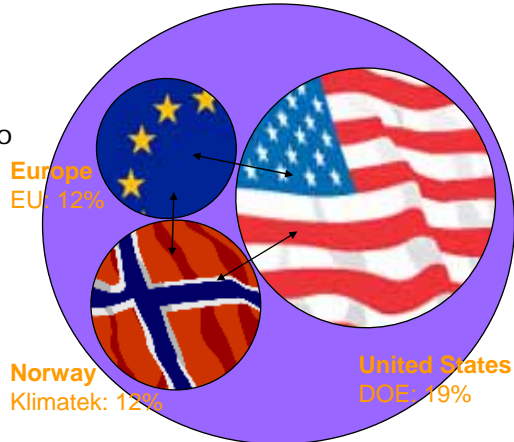


CO₂ Capture Project

Program structure

- International public-private collaboration
- Regional programs
- Sharing among programs to leverage results, reduce duplication
- \$25m Funding
- \$50m Project Cost

Industry
Eight Participants: 57%

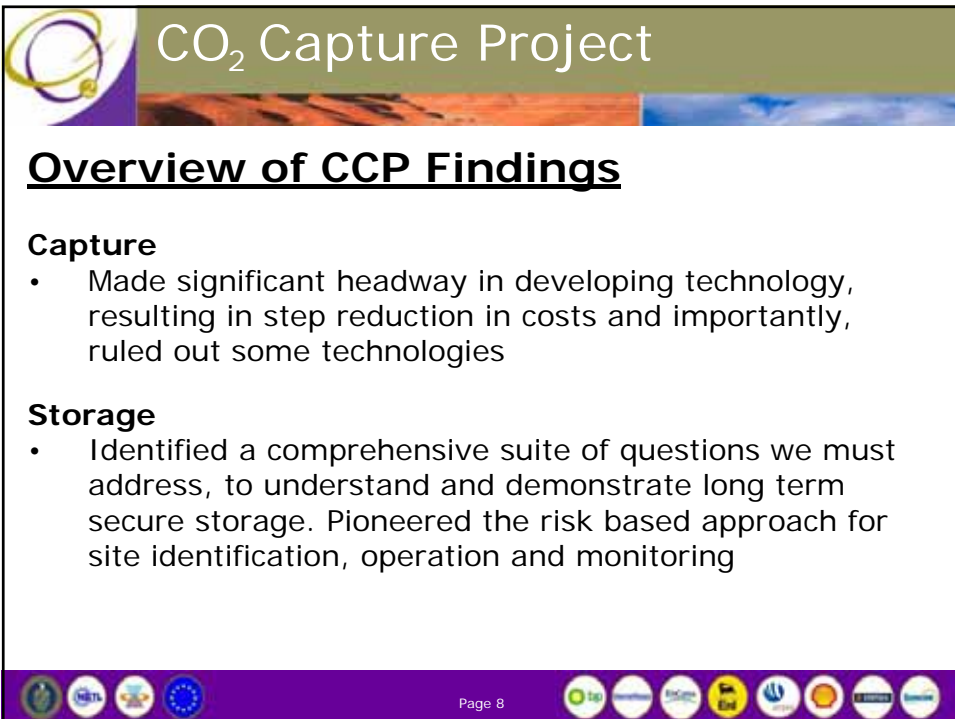
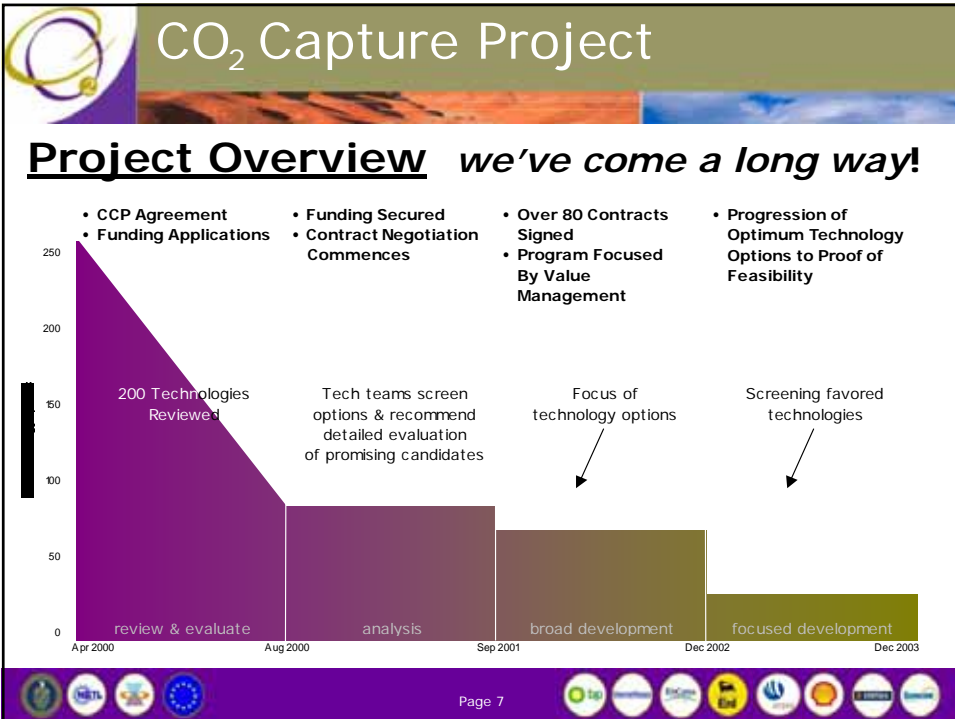


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CO₂ Capture Project - Objectives

- Achieve major reductions in cost of CO₂ capture & storage:
 - 50% reduction when applied to a retrofit application.
 - 75% reduction when applied to a new build application.
- Demonstrate to external stakeholders that CO₂ storage is safe, measurable, and verifiable.
- Progress technologies to:
 - 'Proof of concept' stage by 2003/4 (Commercialization post 2010).

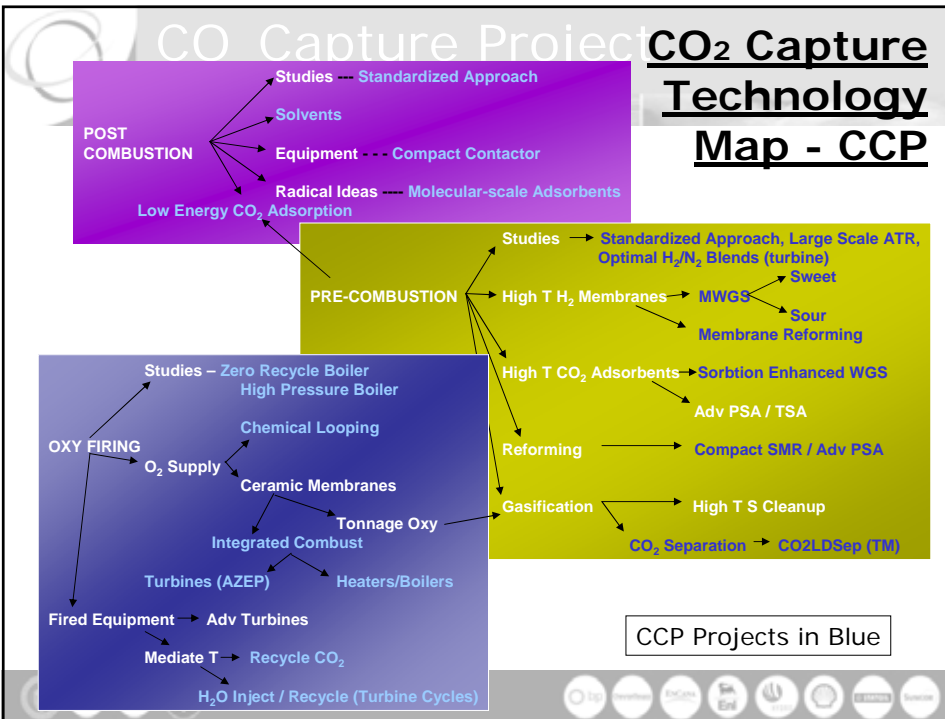
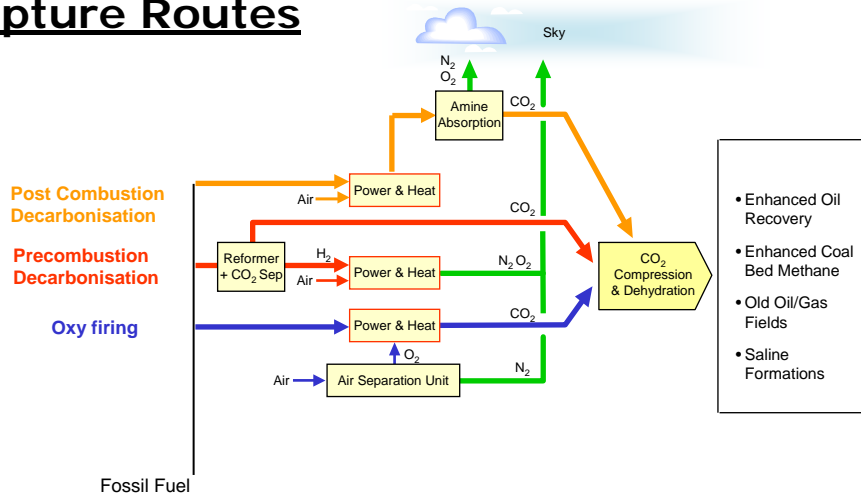






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Capture Routes

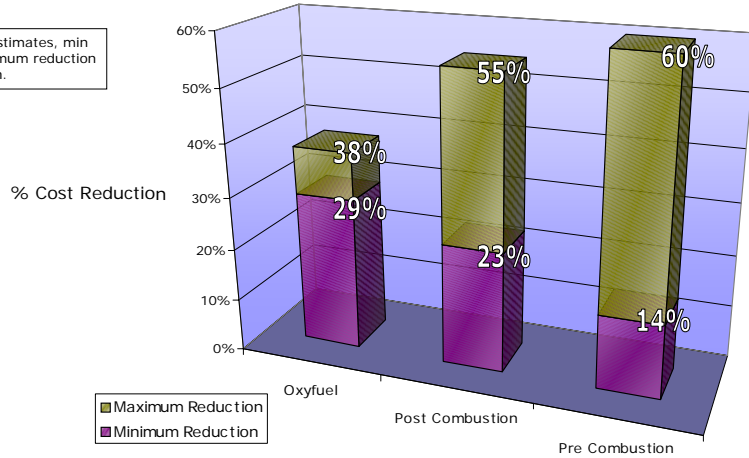




CO₂ Capture Project

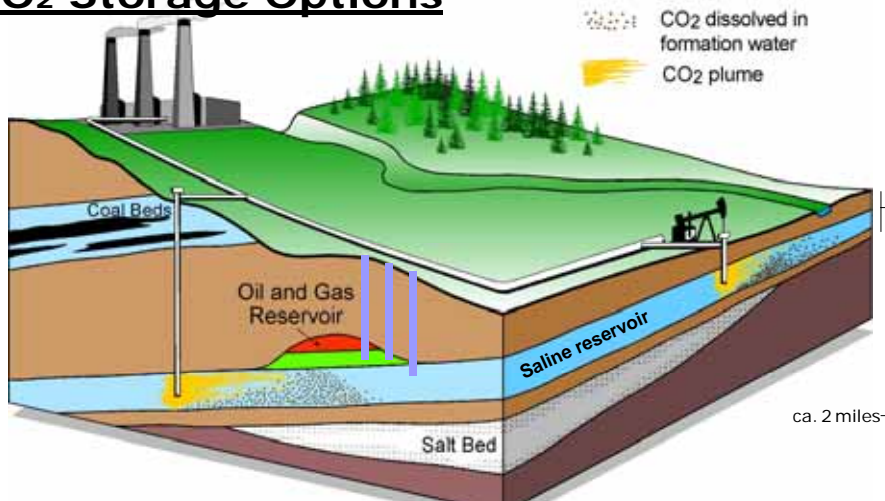
Capture: CO₂ Avoided Cost Reductions*

* +/- 30% cost estimates, min reduction & maximum reduction data points shown.



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CO₂ Storage Options





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Storage: Technologies Delivered

- Developed a **comprehensive understanding of the HSE risks** of, and the requirements for, secure geological storage
 - Geological formations more likely to be secure than man-made wells
 - Depleted oil & gas fields generally be more secure than saline formations
- Assembled a **large database of knowledge**, which will allow the risks associated with geological storage to be quantified and compared to other activities
- Developed an extensive repertoire of **monitoring options**, applicable to a broad range of settings
- Potential **leakage scenarios** have been mapped and matched to remediation actions



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Progress in other program areas

- **Policy and Incentives** - conducted review of current policy matters and identified opportunities and barriers for technology development and application
- **Technology Advisory Board** – provided an unbiased review of project technology and progress
- **Communications** – communications strategy and engagement of NGO's from an early stage.
 - Website, Video & Brochure available
 - Peer review of results
 - Two volume book available Q4.





CO₂ Capture Project 2

Next Steps: CCP Phase 2 (CCP 2)

Industry leaders in Voluntary Action

Moving the Knowledge base Forward



CO₂ Capture Project 2

CCP 2 (2004 – 07) Objectives

1. Further develop CO₂ capture technologies with aim to reduce cost and technical uncertainties prior to demonstration
 - a. Parallel R&D, but sequential pilots
 - b. Stop technology development when success achieved
2. Develop industry guidelines for secure, cost-effective CO₂ geological storage; addressing issues such as site selection, risk assessment, well integrity, monitoring, verification and abandonment
3. Establish an extended network including resources to CCP for CO₂ storage demonstrations





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Success Factors

1. One or more capture technologies is available to pilot (with at least 50% cost reduction from 2000 baseline)
 - a. Retrofit and New-build
2. Deliver a strategy for the future demonstration of at least one capture technology
3. A set of proposed industry standards for Storage, Monitoring, Verification and Abandonment
 - a. Geological storage is accepted in emissions trading schemes (ie. EU ETS 2008-12)
4. A network is established for information sharing among storage demonstrations
5. >40% of CCP2 cash spend is provided by co-funders



CO₂ Capture Project 2

4 Major Themes

1. **Capture Technology** (new/retro, pre/post/oxy, short/long term)
 - i. Continued Cost reduction
 - ii. Reduce technology risk around performance and cost
 - iii. Balance between continuing to develop current technologies vs new technologies
 - iv. Demonstration project strategy (need to decide area and technology of interest)
2. **Storage**
 - i. Storage cost reduction
 - ii. Storage assurance (monitoring, verification & risk assessment)
 - iii. Wells
 - iv. Network
3. **Industry Standards and Acceptance**
 - i. Create favorable business environment for CO₂ Capture & Storage
 - ii. Protocol/ Industry Standards for capture & storage
 - iii. NGO's outreach and Education
 - iv. Specific projects in the area of P&I to inform our companies
4. **Networking**
 - i. Crosscutting

Building on experience & learning from CCP, which has identified the most promising options





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Capture Technology areas of Focus

- **Post Combustion**
 - BIT
- **Pre Combustion**
 - MWGS
 - SEWGS
 - HMR
- **Chemical Looping**
- **Cost and Economic Modelling**

Focus remains on large scale combustion of fossil fuels and hydrogen with CC&S
Technology portfolio will cover retrofit and new build



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SMV R&D Themes (2004+)

"Integrity" (INT)

- a. Further development of appropriate industry analogs
- b. Prediction of rock response to injection
- c. Coupled reservoir-well scenario simulation; Well materials testing / remediation
- d. Seismic prediction of seal competence and incipient leakage

"Optimization" (OPT)

- a. EOR / storage mechanisms, operations and economics
- b. Facility abandonment strategies

"Monitoring" (MON)

- a. Continued development of non-seismic geophysical approaches
- b. Development of direct, remote detection capability
- c. Application of tracers to test migration pathways / predict breakthrough
- d. Well based monitoring

"Risk Assessment" (RA)

- a. Development of a unifying, quantitative methodology

"Demonstrations" (DEM)

- a. Test CCP Technologies





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Demo/Pilot Opportunities/Networks

Assumptions

- SMV will remain a technology R&D provider
- Pilots or demonstrations will not be planned or operated by SMV
- There is a need, however, to test SMV technologies and learn others

Objective

- Involvement in pilots / demos that are:
 - a. Highly leveragable with funds, technologies or in-kind support
 - b. Capable of testing SMV and/or competing technologies
 - c. Promising in terms technology delivery to member companies
 - d. Influential (favorably) on Government, NGOs and the public
 - e. Likely to be well underway within the CCP2 agreement timeframe
 - f. Offer best practice experience and learning in EOR and storage



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Conclusions

- Industry & governments have come together on an international scale, to provide strong leadership on technology development
- A portfolio of technologies that now represent state-of-the-art, with broad application, have been developed in CCP1
- Technology R&D is producing step reductions in cost
- CO₂ sequestration must be proactively managed to reduce risks and ensure broad acceptance
- Communication and publication of results is ongoing
- CCP2 has been launched and through voluntary action, will build on this success

Visit www.co2captureproject.org - for more information





End of Presentation

Questions ?

