



CO₂Capture Project



CCP Overview of Project and Results

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www.co2captureproject.org

Cicero Klimaforum, 16.juni '04



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: Denis 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

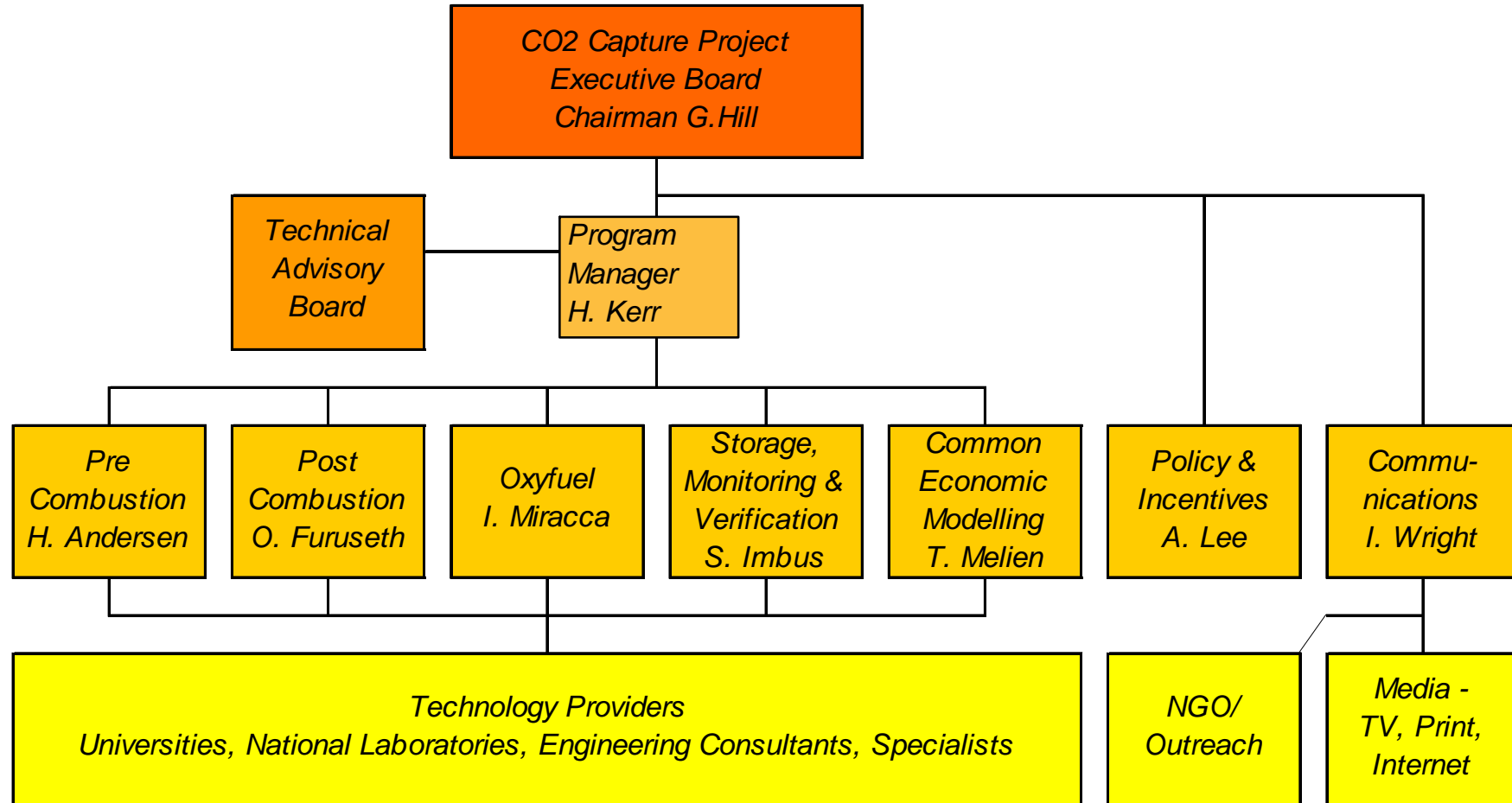
CO₂ Capture Project - Objectives

- 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).





CO₂ Capture Project

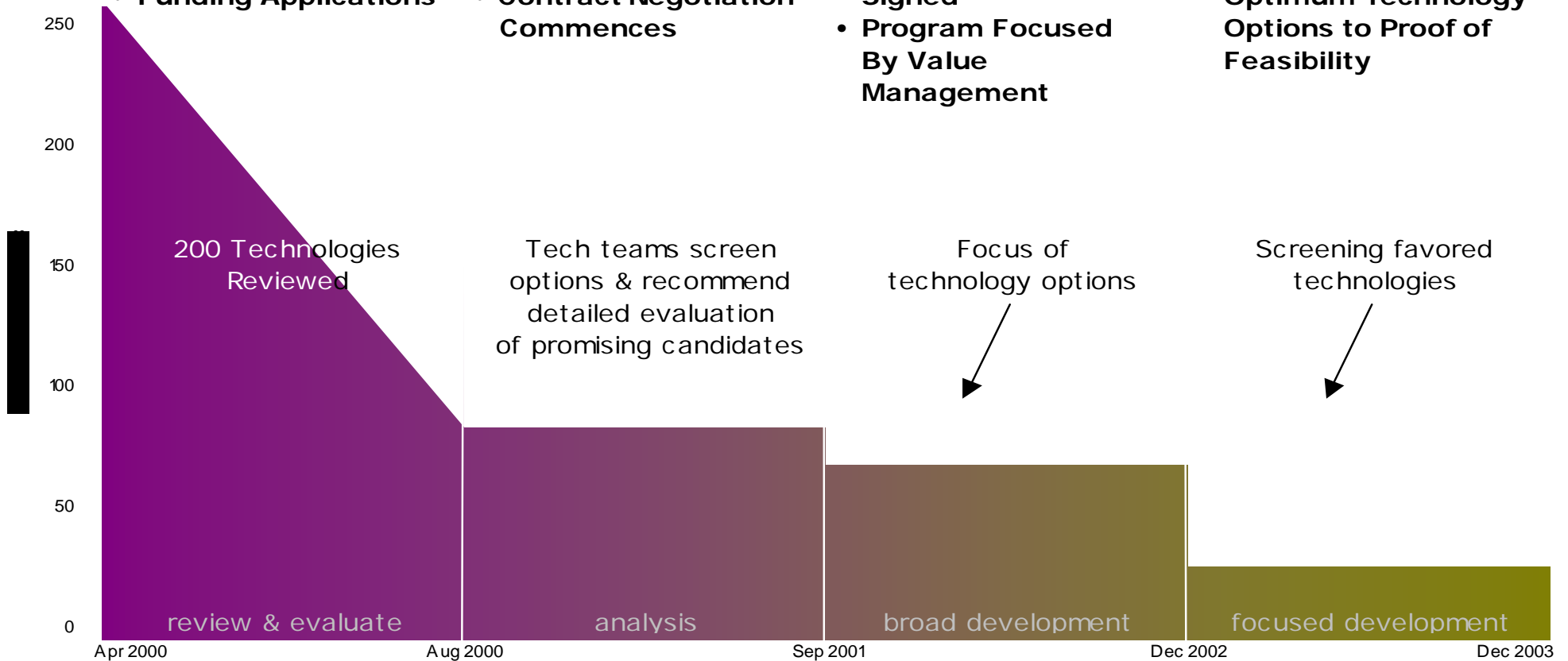




CO₂ Capture Project

Project Overview

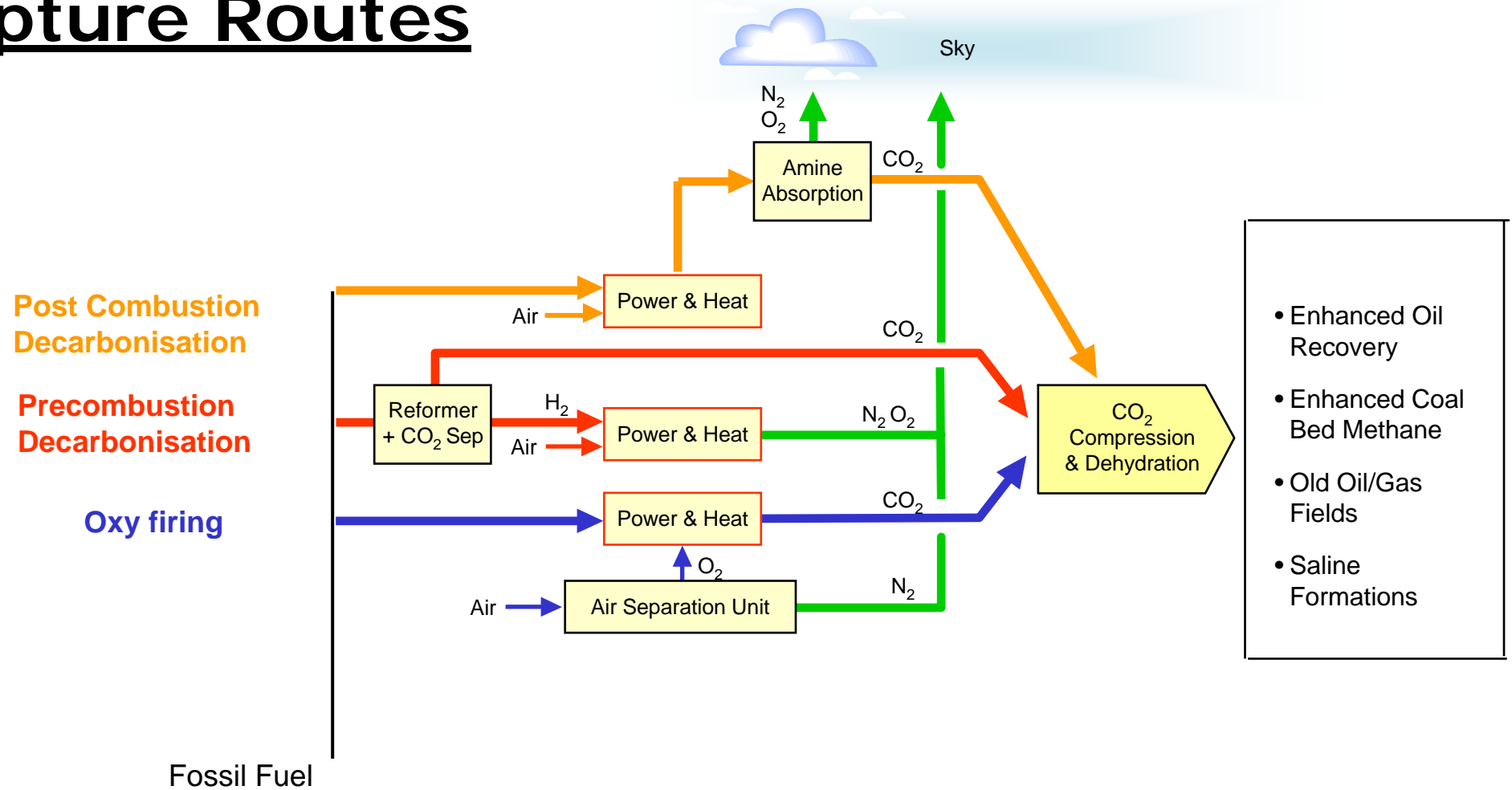
- CCP Agreement
- Funding Applications
- Funding Secured
- Contract Negotiation Commences
- Over 80 Contracts Signed
- Program Focused By Value Management
- Progression of Optimum Technology Options to Proof of Feasibility





CO₂ Capture Project

Capture Routes





CO₂ Capture Project

CCP Scenarios

<u>Scenario</u>	<u>Fuel Source</u>	<u>CO₂ Source</u>	<u>Geologic Sink</u>	<u>Location</u>
<u>Refinery</u>	Hydrocarbon Gas + Liquids	Heaters and Boilers	Storage	UK Scotland
<u>Large Gas Turbines</u>	Natural Gas	Large Electric Power (CCGT)	Storage	Western Norway
<u>Distributed Gas Turbines</u>	Natural Gas	Small Distributed Turbines	Storage	Alaska North Slope
<u>Gasification</u>	Solid Gasification (pet coke)	Steam, H ₂ , and Electric Cogen	Storage	Western Canada



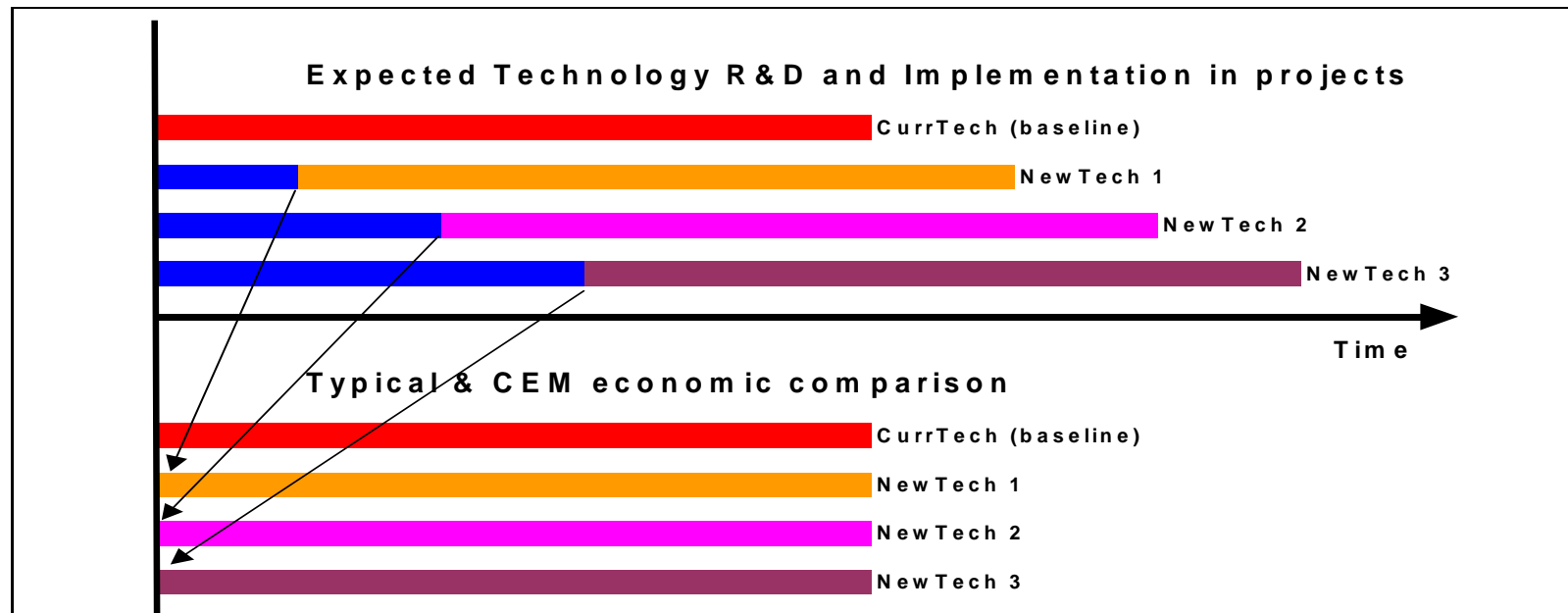


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Compare Mature & Non-mature Technologies

Estimates and screening cover the realization phase of technologies

- do not include pre-realisation technology development / R&D-costs (blue lines)
- handle technologies at various development states similarly w.r.t. cost estimates and economic screening



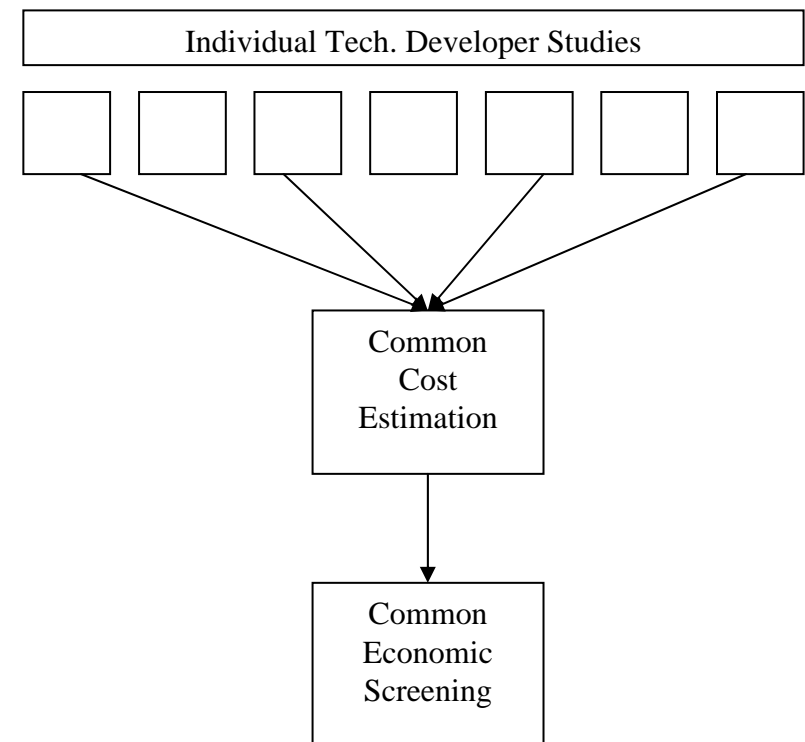


CO₂ Capture Project

Consistency in Estimation and Screening

Transforming a multitude of individual technology studies into a comparable and quantified set of Scenario/Technology options

- Integrating capture technologies into scenarios
- Calibrating physical scopes and capacities
- Capex vs. opex tradeoffs
- Capex and opex estimation methods and assumptions
- Consistent CO₂-cost evaluation

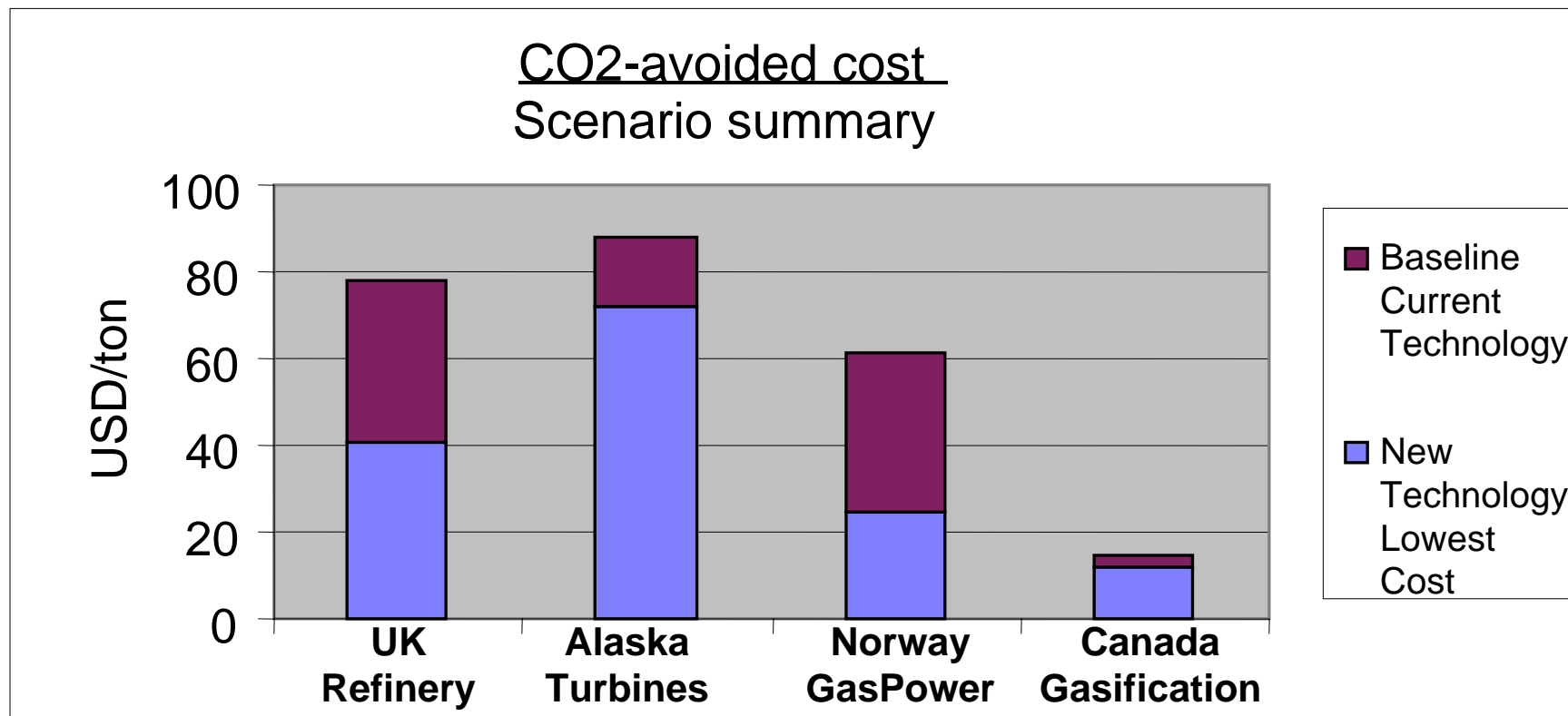




CO₂ Capture Project

CO₂ costs - summary

- capture only, excl. transport & storage
- “generic cost” basis

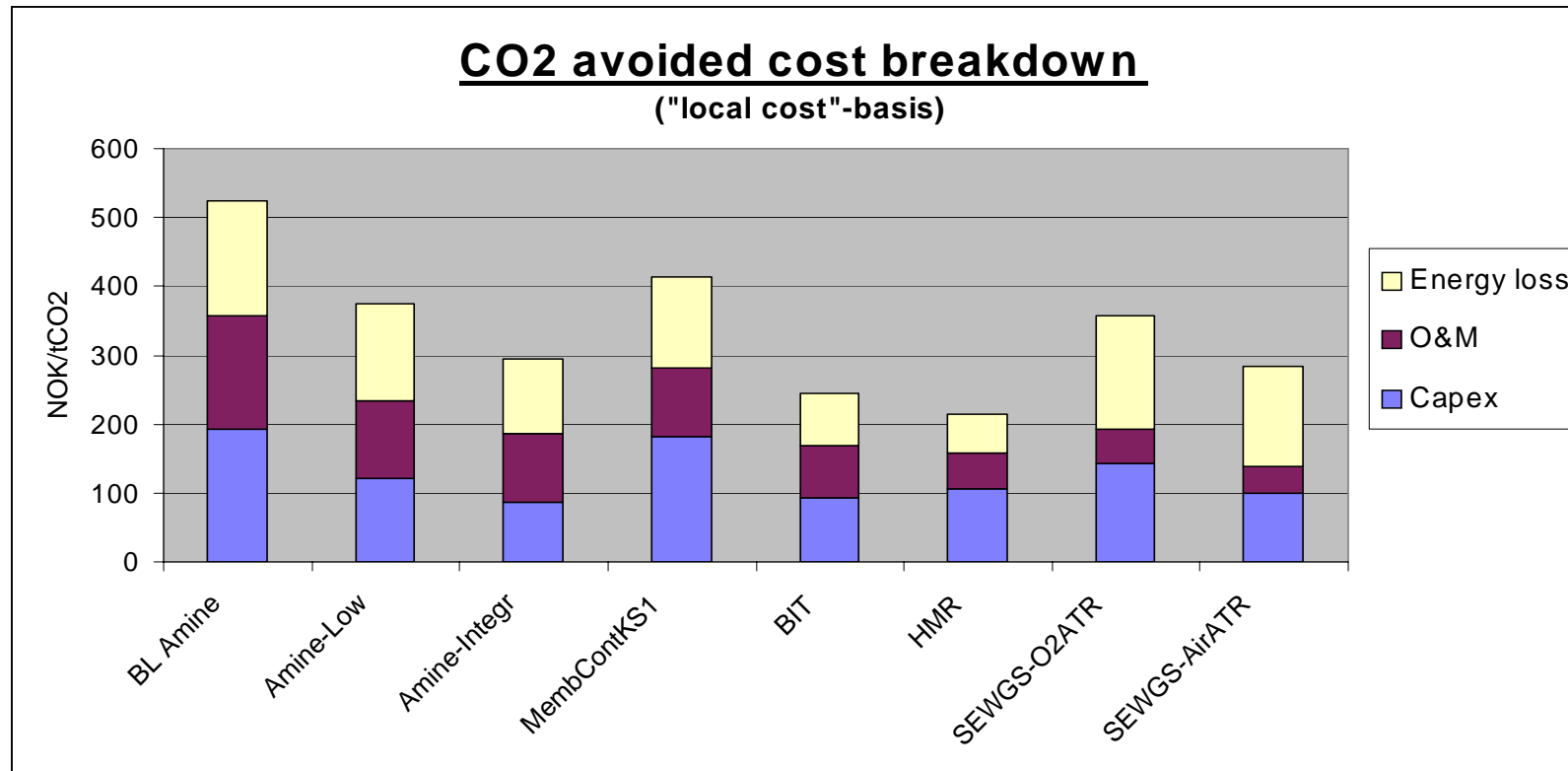




CO₂ Capture Project

CO₂-costs Norway scenario

- capture only, excl. transport & storage
- “local cost” basis

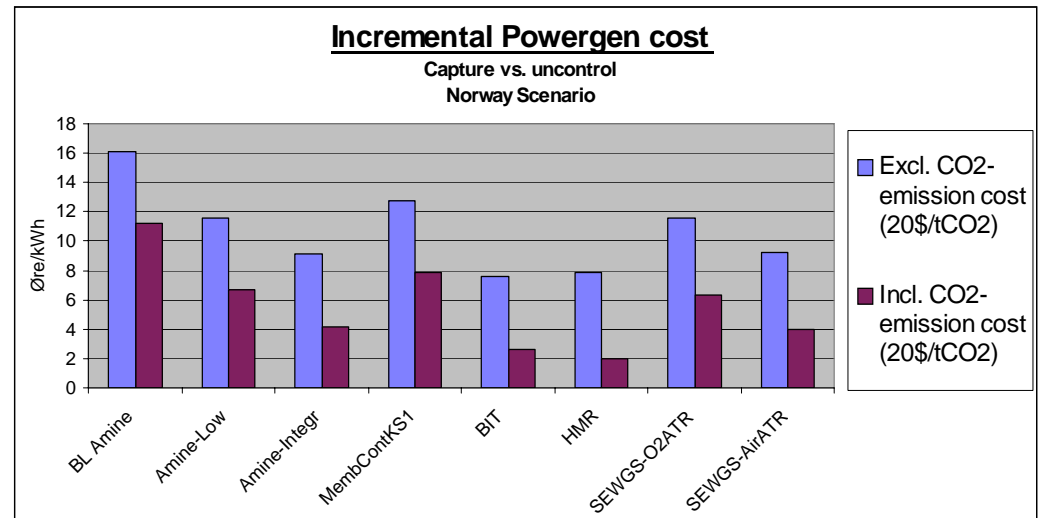
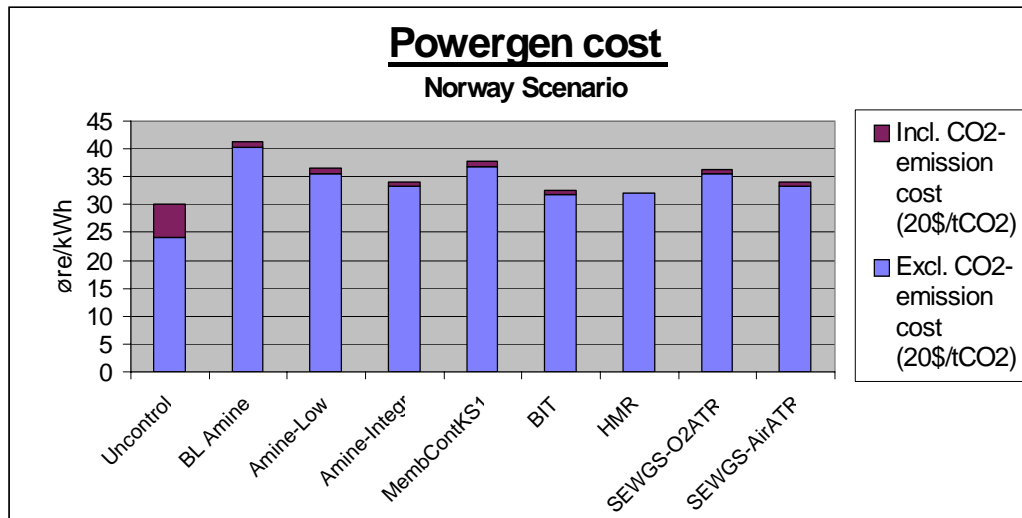




CO₂ Capture Project

Powergen costs Norway scenario

- capture only, excl. transport & storage
- “local cost” basis

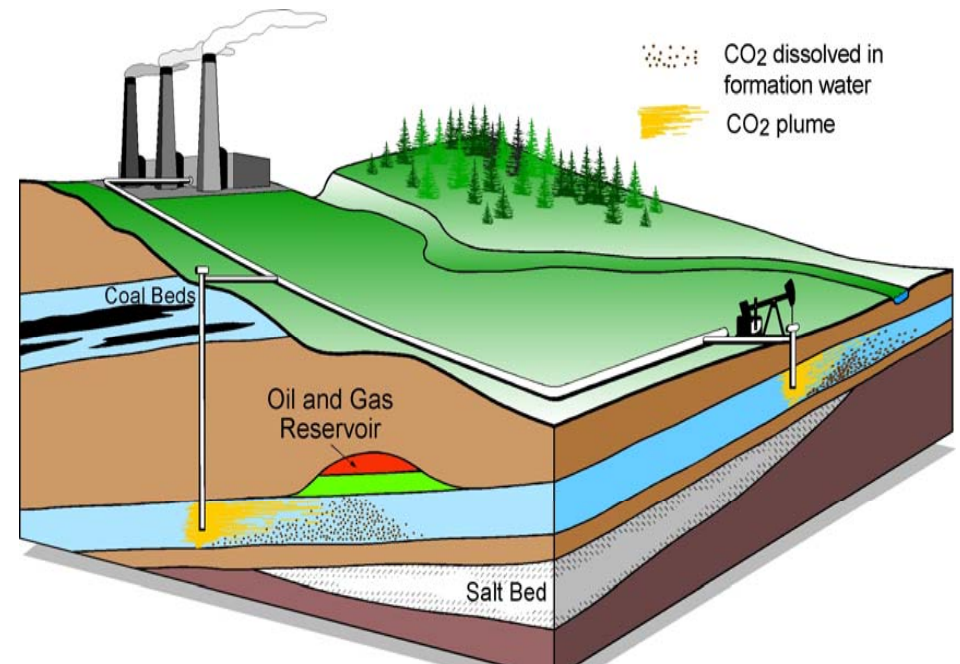




CO₂ Capture Project

CO₂ storage

- Identified risks & requirements for long term secure geological storage
 - **Integrity**
 - natural & industry analogs
 - reservoir & cap rock
 - well stability
 - **Optimization**
 - gas/cond. field storage
 - saline aquifers
 - transportation
 - **Monitoring**
 - geophysical/ geochemical
 - remote
 - atmospheric
 - **Risk assessment**
 - methodological
 - seepage modeling, intervention and remediation
 - environmental/ public perception





CO₂ Capture Project

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 Q4-2004





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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 with broad application have been developed and represent state-of-the-art
- 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 in hand.
- Visit www.co2captureproject.org - for more information
- Planning in hand to build on this success with CCP2





CO₂ Capture Project

CCP Long-term Plan

- 2000-03 **Phase 1:** Concept Development & Design
- 2004-07 **Phase 2:** Aiming for Demonstration
- 2008-10 **Phase 3:** Commercialization

