

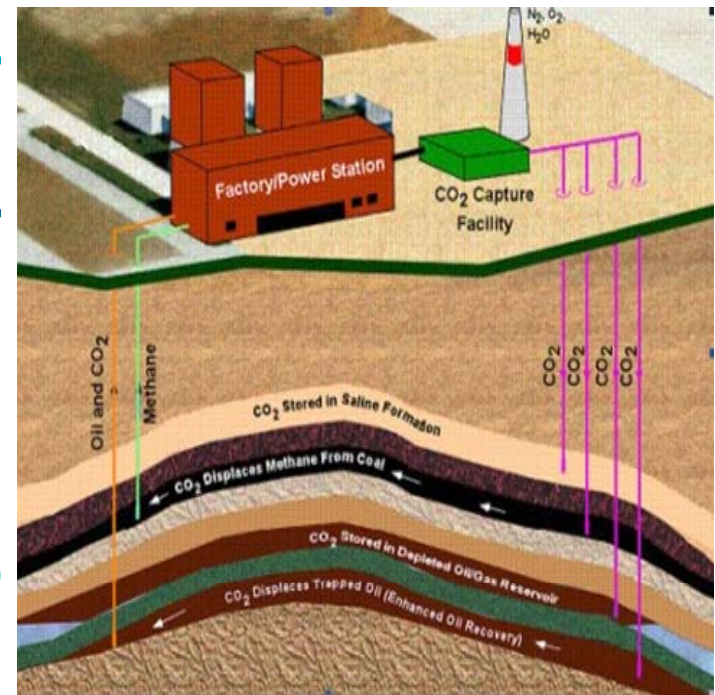
CCS - AN INSURANCE PERSPECTIVE

UNFCC CCS WORKSHOP, ABU DHABI

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Middle East



Agenda

- Marsh Overview
- Involvement in CCS
- Insurance Classes
- CCS Project Phases
- Insurance Considerations for CCS Project Phases
- Further Thoughts on Post Closure Issues
- Conclusion / 'State of Play Matrix'

Marsh Overview

Who Are We and What Do We Do?

- Marsh – a leading global insurance broker and risk advisor
 - 300+ offices
 - 100+ countries
 - All industrial and commercial sectors
- Provide guidance on:
 - Risk identification
 - Risk mitigation
 - Risk management and transfer strategy (e.g. insurance)
- Place insurance with insurance markets
 - Price
 - Coverage (classes of insurance / breadth of cover)
 - Insurer Security
 - Service (e.g. claims handling)

Summary of Key Insurance Classes Relevant to CCS

Property Damage

- Natural Perils
- Fire / Explosion
- Accidental Damage
- Terrorism / Civil Commotion
- Defective Design / Workmanship

Selected Other Covers

- Marine Cargo
- Employers' Liability
- Management Liability (PI, D&O)
- Contractors' Plant & Equipment

Control of Well

- Loss of Control ('Blowout')
- Pollution from Well
- Redrilling

Liability

- General Third Party Property
- Injury to Third Party Individuals
- Environmental Impairment Liability

Loss of Revenue

- Construction Phase (DSU)
- Operational Phase (BI)
- Customers & Suppliers Extensions

Insurance Market Exposure to Major CCS Projects

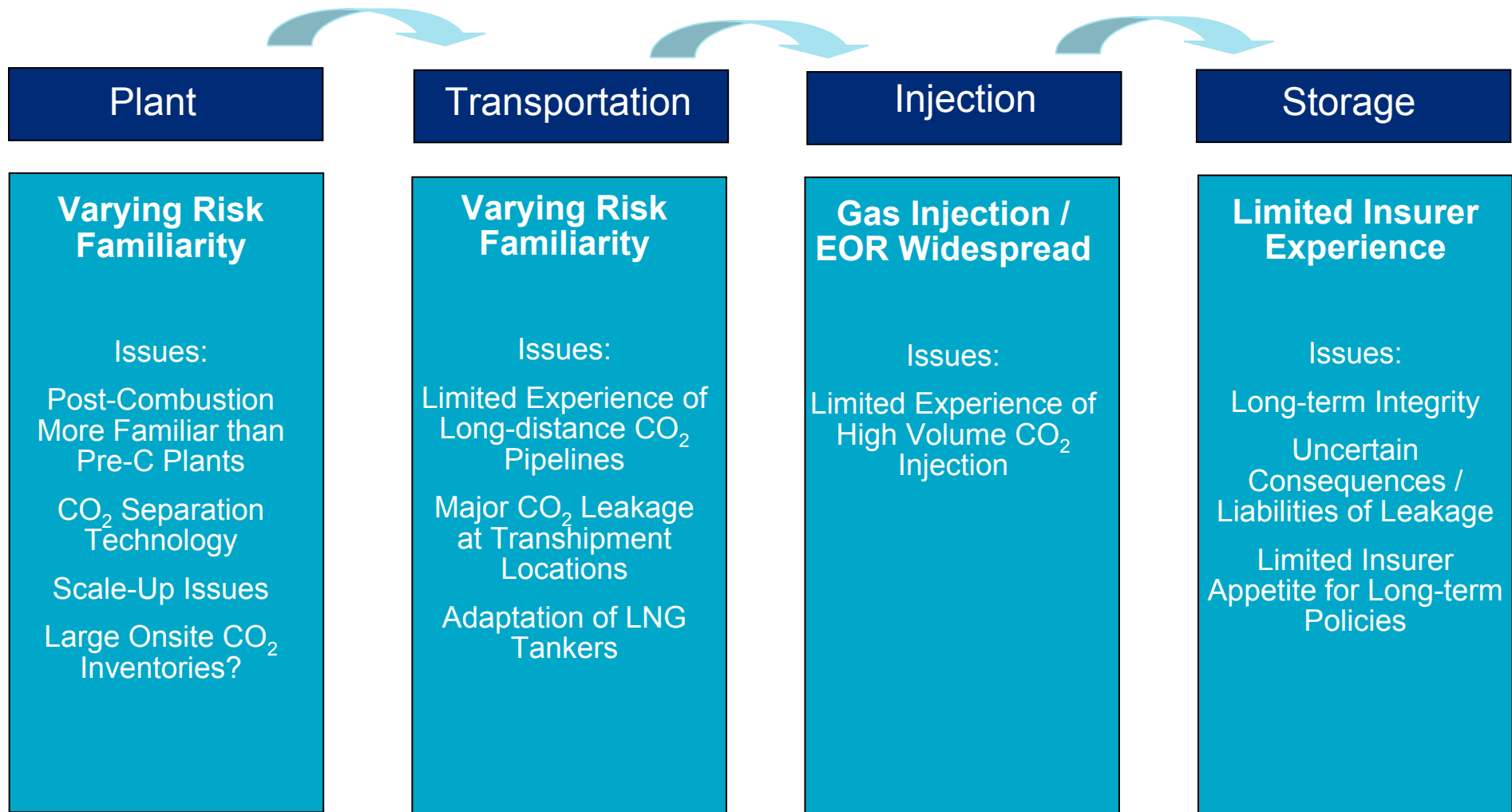
Selected Examples – Operational Phase / In Development

Project	Description	CCS-Relevant Elements
Basin Electric - Weyburn CCS Project (Canada)	CO₂ produced at Dakota Coal Gasification Plant pipelined (320km) to Weyburn oilfield for EOR (Enhanced Oil Recovery).	<ul style="list-style-type: none"> ▪ CO₂ Capture & Processing ▪ CO₂ Transit ▪ CO₂ Injection ▪ EOR / CO₂ storage
Statoil - Sleipner West Field (N.Sea)	Associated CO₂ from gas production is separated using an amine process and re-injected in the deep saline Utsira Field formation.	<ul style="list-style-type: none"> ▪ CO₂ Capture & Processing ▪ CO₂ Injection ▪ CO₂ storage
BP / Statoil / Sonatrach – In Salah Gas Project (Algeria)	As above and re-injected into separate section of the gas reservoir.	<ul style="list-style-type: none"> ▪ CO₂ Capture & Processing ▪ CO₂ Injection ▪ CO₂ storage
Chevron / Shell – Gorgon Gas Development Project (Australia)	Major gas production & LNG project will include CO₂ CCS strategy.	<ul style="list-style-type: none"> ▪ CO₂ Capture & Processing ▪ CO₂ Injection ▪ CO₂ storage

CCS Project Overview: Insurance Perspective - Viewed by Project Phases



CCS Project Overview: Insurance Perspective - Viewed by Project Elements



CCS Insurability – Further Comments

Technology Risk

- CO₂ Capture to Injection – Mostly (relatively) familiar technology
- Insurance industry should accommodate developments, though some issues
 - Restrictions on most prototypical elements
 - Loss of containment – new modelling

Loss of Revenue

- Revenue model requires clarity to enable basis of indemnity to be defined by insurance
- ‘Operational’ phase losses more easily defined (contractual undertakings, regulatory framework)
- Financial consequences to OPGO in event of leakage from storage? Fine? (insurance exclusion) Purchase replacement credits? (what price?)

Liability Issues

- Near-term General Third Party Liability risks addressed via traditional policies but key exclusions (Sudden & Accidental pollution losses only)
- Environmental Impairment Liability coverage exists (Gradual Pollution, Habitat / Biodiversity Damage cover)
 - Developed in response to Contaminated Land legislation and imposition of Strict Liability for responsibility / clean-up
 - First and Third party cover
 - Some offshore policies being written
 - Scope for construction and operational phase covers; limited role in post-closure phase

Long-term Liability Management Issues

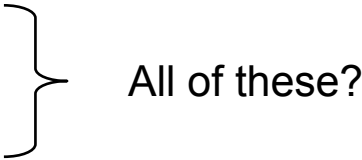
- Short – medium term risks and liability related to construction and operational phases should be covered by contract and traditional risk transfer (insurance)
- Long-term liabilities are more difficult to cover due to the timeframes (decades / centuries) and the lack of experience in estimating significance of intrinsic risks:
 - Carbon
 - Damage to “the climate”
 - Long term “value” of carbon credits
 - In-situ
 - Public health
 - Ecosystems
 - Resources
 - Cross-border issues
 - Leakage in other regions / countries

“Underwriting” the risk

- How much could it cost?
- What is likelihood and timing?
- Who will be responsible?

Long-term Liability Management Issues

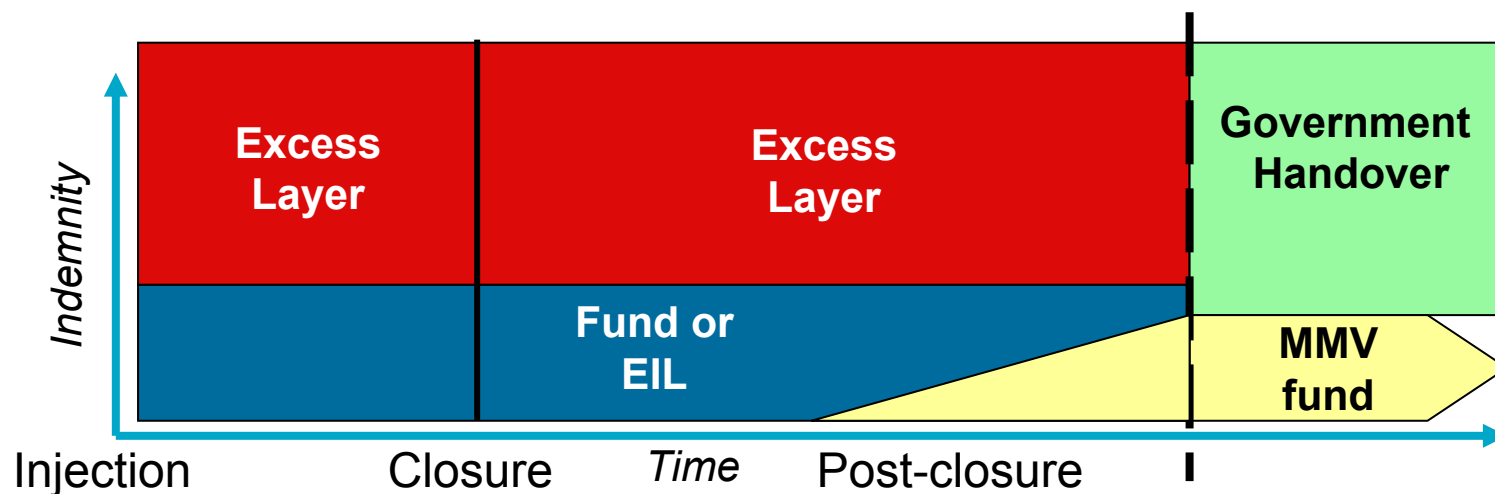
Risk quantification for all aspects of a CCS project will need to be carried out:

- What is the nature of all possible risks?
- What are the magnitudes and likelihood of all potential liabilities?
- Who could be an injured party?
 - Neighbouring property owners
 - Local resource owners
 - The General Public
 - The 'Environment'
- Who will be liable? (OR who will be best placed to shoulder the liability?):
 - Operator / Developer / Owner
 - Financiers
 - Government

All of these?
- How will Measuring, Monitoring and Validation be undertaken?

Post Closure Risk Transfer Insurance and Other Vehicles

- Well control for capped wells
- Escrow fund or collateral for potential environmental risks or primary environmental liability cover
- Fund for post closure MMV = measurement, monitoring, and verification, up to and past handover date
- Optional excess environmental liability coverage up to date of transfer / indemnity by host government



Insurance Industry State of Play

- ✓ Many aspects of CCS-chain technology relatively familiar; new elements will be accommodated (some insurance small print to be expected!)
- ✓ Established insurance products will cover Construction and Operational phases; Energy industry already engaging with Decommissioning issues
- ✓ Environmental Impairment insurance market evolving (c.f. habitat / biodiversity damage cover for offshore risks)
- ✓ Initial insurance market offering covering CO2 sequestration operations (operational phase only)
- ✗ General insurer reluctance / inability to offer long-term policies (post-closure)
- ✗ Potential liabilities surrounding CO2 storage need to be better understood and quantified before significant transfer to insurance market possible



Insurance will play a role but additional risk transfer mechanisms will also be required in managing long-term liability issues



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