

## **CO<sub>2</sub> /EOR**

# **Some Regulatory Issues**

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## Critical Questions

- Coverage of CCS Legislation
- Acceptance criteria
- Transition provisions from EOR to CCS
- Lessons learnt

## Five Distinct Storage Storage Scenarios

- Incidental storage during EOR operations
- Incremental storage during EOR operations
- Storage during buffering or balancing operations
- **Incremental storage after EOR operations : where planned a 'combined EHR/CCS operation'**
- Long term storage without EOR for climate change purposes

*after Marston (2013)*

# Different Jurisdictions : EOR : CCS

## EOR

## CCS

UK	Petroleum Act	Energy Act
Netherlands	Mining Act	Mining Act
France	Mining Code	Environment Code
Queensland	Petroleum Acts	Greenhouse Gas Storage Act
S. Australia	Petroleum and Geothermal Energy Act	Petroleum and Geothermal Energy Act
Alberta	Oil & Gas Conservation Act	Energy Resources Conservation Act

## Legislation for EOR and CO<sub>2</sub> storage for climate change have distinct goals

- EOR legislation designed to prevent or minimize environmental impacts during and post operations – release or leakage of CO<sub>2</sub> without impact not a core concern.
- CO<sub>2</sub> storage for climate change legislation designed primarily to secure CO<sub>2</sub> stored as permanently as possible – preserve integrity of site - and also to prevent/minimize local environmental impacts.

## Core International Conventions do not apply to incidental storage of CO<sub>2</sub> from EOR operations

- 1966 London Protocol excludes from definition of ‘dumping’ :
  - “*The disposal or storage of wastes or other matter directly arising from, or related to the exploration exploitation and associated off-shore processing of seabed mineral resources.*”

## 1992 OSPAR Convention

- Excludes from definition of ‘dumping’ the disposal of :
- *”of wastes or other matter incidental to, or derived from, the normal operations of vessels or aircraft or offshore installations other than wastes or other matter transported by or to vessels or aircraft or offshore installations for the purpose of disposal of such wastes.....*

## EU Directive 2009/31/EC : Preamble 20

“Enhanced Hydrocarbon Recovery (EHR) refers to the recovery of hydrocarbons in addition to those extracted by water injection or other means.

**EHR is not in itself included in the scope of this Directive.** However, where EHR is combined with geological storage of CO<sub>2</sub>, the provisions of this Directive for the environmentally safe storage of CO<sub>2</sub> should apply..... “



## Directive in law applies to “Geological Storage” (Art 1)

- Geological storage defined to mean “**injection accompanies by storage of CO<sub>2</sub> streams in underground geological formations.**”
- No motivation for storage in definition, and all EOR operations leave some CO<sub>2</sub> in hydrocarbon bearing strata – so is all EOR covered in law?

## EO Directive and EOR

- Better interpretation is that where injection and storage an inevitable part of EOR operation then not covered by Directive.
- But if you move into incremental injection and storage during or after EOR operations (i.e. over and above what is needed for operation) , then Directive engaged.
- But better to make the division clear in design of legislation

# Transition and the Challenge of Acceptance Criteria

- CO2 storage legislation for climate change will contain acceptance criteria, while recognizing that pure CO2 from capture processes not possible. .
- EU Directive therefore requires that a CO2 stream “**shall consist overwhelmingly of carbon dioxide.**”
- “**overwhelmingly of carbon dioxide**” deliberately chosen by scientific committee of London Dumping Convention and European Commission to allow for case by case variation

## EOR operations

- During EOR operations CO<sub>2</sub> being recycled inevitably becomes contaminated with sub-strata substances such as gas. Implacable or uneconomic to decontaminate

If then later is presently disposed will it meet the CO<sub>2</sub> acceptance criteria?

## Acceptance Criteria where CO<sub>2</sub> used for EOR operations and later disposed of for climate change purposes

- Art 12 prohibition of addition of waste or other other matter *added for the purpose of disposing* of such material
- Art 12 allows **‘incidental associated substances from source, capture and injection process’**

## Acceptance Criteria

- **Incidental substances from the source capture or injection process acceptable if do not affect integrity of storage or pose significant risks**

**Art 12**

## Acceptance Criteria – does it apply at all?

- It could be argued that acceptance criteria applies only to CO<sub>2</sub> streams from flow of substances resulting from CO<sub>2</sub> capture – i.e. it covers only CO<sub>2</sub> streams delivered to site, not subsequent intermingling of sub-strata substances with CO<sub>2</sub>.
- But probably would not be accepted.

## “Overwhelmingly” criteria has built in flexibility

- It is perfectly rational to conceive of criteria that is different where CO<sub>2</sub> disposed of directly and where it is disposed of following EOR operations and intermingling.
- But must still be ‘overwhelmingly’ CO<sub>2</sub> under the Directive
- Guidance needed on this. Commission current Guidance does not deal with this.



## Transition Provisions

- UK : power of Secretary of State to make order to apply EU CCS regime to any EOR activities
- Australia : Commonwealth : Guidelines for injection and storage (2011): *if the injection of the GHG substance is for the purposes of disposing of the GHG, then the petroleum titleholder would be subject to the GHG injection and storage provisions of the Act and would need to obtain a GHG title* (Attachment 5)

# US

- USA EPA Draft Program Guidance on Transitioning Class II Wells to Class VI Wells (Dec 2013) : *No single factor should be relied on to make a determination of injection purpose and potential risk*

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## Some key lessons

- In designing CCS legislation understand technical aspects of EOR
- Ensure as far as possible consistency between licencing regimes for EOR and CCS so that reasonably straightforward to convert from one to the other.
- Probably sensible to have same bodies issuing licences/permits
- Explicit transition procedures

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