

CO2 EOR in Gulf States

Regulatory Issues

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EOR and CO₂ storage for climate change legislation

- EOR legislation designed to prevent or minimize environmental impacts during and post operations.
- CO₂ storage for climate change legislation designed primarily to secure CO₂ stored as permanently as possible – preserve integrity of site - and also to prevent/minimize environmental impacts.

Five Distinct Storage Storage Scenarios

- Incidental storage during EHR operations
- Incremental storage during EHR operations
- Incremental storage after EHR operations : where planned a 'combined EHR/CCS operation'
- Storage during buffering or balancing operations
- Long term storage for climate change purposes
after Marston (2013)

Critical Questions

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

EU CCS Directive 2009/31/EC

- Does the Directive cover EOR operations involving CO₂ storage?
- No explicit provision in the Directive itself giving definitive answer

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 CO₂, the provisions of this Directive for the environmentally safe storage of CO₂ should apply..... “

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

- Geological storage defined to mean **“injection accompanies by storage of CO₂ streams in underground geological formations.”**
- No motivation for storage in definition, and all EOR operations leave some CO₂ 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

Acceptance Criteria

- CO₂ storage legislation for climate change will contain acceptance criteria.
- Pure CO₂ from capture processes not possible
- EU Directive therefore requires that a CO₂ stream **“shall consist overwhelmingly of carbon dioxide.”**

Acceptance Criteria

- “**overwhelmingly of carbon dioxide**” deliberately chosen by scientific committee of London Dumping Convention and European Commission to allow for case by case variation
- European Parliament unsuccessfully tried to specific numerically based criteria but rejected
- No waste or other material may be added for the purpose of disposing of that waste

Acceptance Criteria

- Incidental substances from the source capture or injection process or additional substances used for monitoring acceptable if do not affect integrity of storage or pose significant risks Art 12
- Art 12 gives Commission power to issue GUIDANCE on acceptance criteria
- See Section 3 **Guidance Document 2**
Characterization of the Storage Complex, CO₂ Stream Composition, Monitoring and Corrective Measures European Commission 2011

Acceptance Criteria where CO₂ used for EOR operations and later disposed of for climate change purposes

- Art 12 prohibition of addition of waste or 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 – does it apply at all?

- It could be argued that acceptance criteria applies only to CO₂ streams from flow of substances resulting from CO₂ capture – i.e. it covers only CO₂ streams delivered to site, not subsequent intermingling of sub-strata substances with CO₂.
- But probably would not be accepted.

“Overwhelmingly” criteria has built in flexibility

- It is perfectly rational to conceive of criteria that is different where CO₂ disposed of directly and where it is disposed of following EOR operations and intermingling.
- But must still be ‘overwhelmingly’
- Guidance needed on this

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

Transition Provisions

- UK : power of Secretary of State to make order to apply 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)
- 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*

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.
- Explicit transition procedures
- Probably sensible to have same bodies issuing licences/permits