Advancing CO_2 Utilization: Technical Aspects

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Current and Potential CO_2 Use

Categories:

- Resource Recovery: **enhanced oil recovery (EOR)**, enhanced gas recovery (EGR), enhanced coalbed methane recovery (ECBM), oil shale recovery, and possibly in hydraulic fracturing and geothermal energy production
- Non-consumptive use: desalination, slurry transport, heat-transfer fluid, freight pipelines, and solvent extraction
- Consumptive use: production of mineral carbonates (surface carbonation), chlorine, fertilizers and building materials (concrete)

Notes: Only CO_2-EOR is a mature technology, others are in demonstration, pilot, testing or concept phases
Hydrocarbon resource recovery holds the greatest potential for CO_2 use, the other consumptive uses have a limited market and need demonstration at scale

CO_2 Use in EOR

- 119 miscible CO_2-EOR operations in the world (112 in the U.S., 6 in Canada and 1 in Brazil), since 1972
- 8 immiscible CO_2-EOR operations in the U.S., 5 in Trinidad, 2 in Brazil, 1 in Turkey, since 1974
- CO_2 sourced mainly from natural reservoirs in the U.S., but also from anthropogenic sources like fertilizer, ammonia, gas plants and coal gasification plants
- Only the Weyburn – Midale CO_2-EOR operation in Canada, operating since 2000 with CO_2 from North Dakota Coal Gasification Plant is officially recognized as a CCS operation, although GCCSI lists a few more operations in the US that precede climate change issues

Main Technical Issues in Transitioning from CO_2-EOR to CO_2 Storage

- Injection well requirements in some jurisdictions (e.g., Class VI instead of Class II in the U.S.)
- Area of review: the reservoir only for CO_2-EOR, potentially larger for CO_2 storage
- Offset wells within the area of review (producing, abandoned), monitoring for CO_2 leakage and remediation of defective wells
- Monitoring for CO_2-EOR (e.g., wellhead injected and produced fluids) versus monitoring for CO_2-Storage (in and above the reservoir, shallow subsurface, surface)
- Reporting for CO_2-EOR versus CO_2 storage

Main Policy Issues in Transitioning from CO_2-EOR to CO_2 Storage

- CO_2 has to originate from an anthropogenic source
- Classification of CO_2: traded commodity, waste or hazardous substance?
- Jurisdictional in federal states
- Jurisdictional between departments/ministries in government
- Tenure and long term liability
- Regulatory framework
- Economic (price on/credits for stored CO_2)