

A CDM Methodology for CCS in Aquifers

- Leakage and Permanence -

*Workshop on CDM Methodological Issues
in regard to CCS*

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Permanence

IPCC Special Report

- The fraction retained in **appropriately selected and managed geological reservoirs** is
 - very likely to exceed 99% over 100 years, and
 - is likely to exceed 99% **over 1,000 years**.
 - “Likely” is a probability between 66 and 90%,
 - “very likely” of 90 and 99%
- For well-selected, designed and managed geological storage sites, the vast majority of the CO₂ will gradually be immobilized by various trapping mechanisms and, in that case, **could be retained for up to millions of years**.



Target of Permanence is 1,000 years

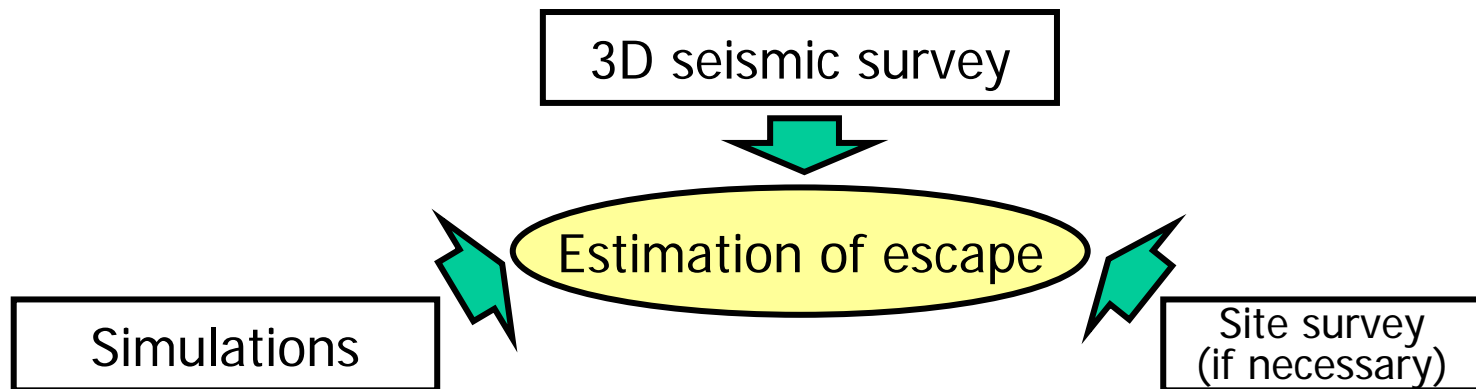
Selection of Appropriate Reservoir

- Geological conditions vary widely from site to site
- Site-specific evaluations with data and their analytical methods selected on a site specific basis

Item	Types of Data in General
Reservoir	Reservoir structure
	Physical properties of the reservoir
	Lateral/vertical stratigraphical and hydraulic continuity of the reservoir
	Pressure and flow regimes of formation waters
	Chemical reactions with CO ₂
Cap rock	The extent, nature and sealing capacity of the cap rock
	Chemical reactions with CO ₂
Geological stability	Documentation and maps of fractures and faults
	Seismological data, geomorphological data and tectonic investigations to indicate neotectonic activity.
	Historical geology
Others	Sealing condition of existing or abandoned wells

Monitoring of Injected CO₂

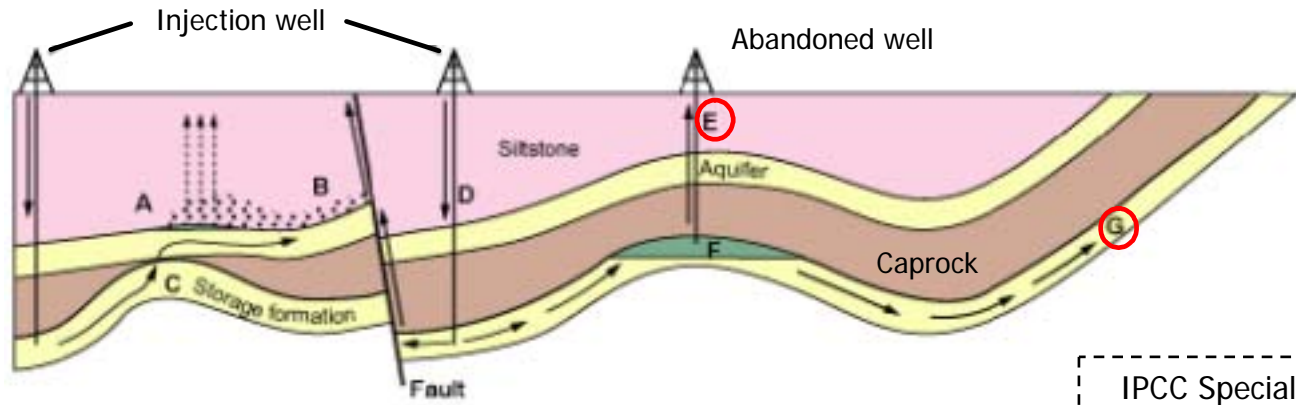
- 3D seismic surveys every 7 years (to the end of the crediting period):
 - To confirm that the injected CO₂ behaves as expected
 - To help determine the volume of escape if it occurs
- Estimation of the amount of escape from the reservoir



Leakage

■ Potential escape routes for good reservoirs:

- Dissolution (G) → Simulations
- Abandoned wells (E) → Simulations
- Unpredicted escape routes → 3D seismic & site survey



Leakage

Accounting of Leakage

- Estimated escape during the crediting period is canceled retrospectively at the end of the period.
- Estimated escape for the future is counted in the present project emissions considering discount factors,

