

Pillar 2 - Project lifecycle: subsurface technical-regulatory requirements

This pillar examines the regulatory subsurface technical requirements that attach to a geological storage project across its lifecycle, from site appraisal through operation to closure and post-closure. The analysis is regulatory and comparative: it addresses what the frameworks require, not the engineering methodologies by which operators comply. Environmental-licensing and environmental-governance aspects of the lifecycle are addressed within Pillar 1 (§1.4); this pillar concentrates on the technical-regulatory requirements expected to fall within the competence of the ANP.

2.1 Storage site characterization and appraisal requirements

This section will examine the regulatory requirements governing the appraisal and characterization of a prospective storage site, and the authorization of the exploration/appraisal phase that precedes storage operation. It will compare how jurisdictions define the information, demonstrations and approvals required before a storage permit may be granted.

Expected subtopics

- Regulatory requirements for site characterization and containment demonstration.
- Storage capacity and suitability demonstration as a condition for permitting.
- Data and documentation requirements for authorization.
- Risk-assessment obligations at the permitting stage.

2.2 Subsurface Monitoring, measurement and verification (MMV) technical requirements

This section will analyze the regulatory MMV obligations applicable throughout the operational phase, including CO₂ injection, and during closure and the post-operational and post-closure phases. The focus is on what must be monitored, measured, reported and verified, the duration and continuity of those obligations, and the regulatory consequences of detected irregularities, rather than on the technologies used to fulfil them.

Expected subtopics

- Regulatory monitoring obligations.
- Reporting and verification requirements.
- Leakage-detection and corrective-measures obligations.
- Interface with environmental monitoring obligations (link to Pillar 1, §1.4).

2.3 Closure and post-closure requirements

This section will examine the regulatory requirements governing site closure and the post-closure period. It will compare the conditions under which a site may be closed, the obligations that persist after closure, and the duration of the post-closure monitoring period.

Expected subtopics

- Closure and decommissioning subsurface technical requirements.
- Technical conditions and demonstrations required for approval of site closure.
- Post-closure monitoring requirements and duration.

Technical criteria for demonstrating storage-site stability and containment.

2.4 Comparative assessment and approaches for technical life-cycle requirements

Building upon the preceding sections, this chapter will synthesize the principal lifecycle-regulation approaches adopted across Brazil and the selected jurisdictions, highlighting convergences, divergences and emerging practice. Rather than advocating a single model, the analysis will present alternative regulatory design options, discussing their respective advantages, disadvantages and implementation considerations, with specific observations regarding their applicability to the Brazilian context.

Expected subtopics

- Comparative matrix of Brazil and selected jurisdictions.
- Convergences and divergences across the lifecycle.
- Advantages, disadvantages and implementation considerations.