

# Guidance Document 3: Criteria for Transfer of Responsibility to the Competent Authority

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# Scope of GD3

**Objective:** Guide operators and competent authorities (CAs) on how to interpret the requirements in the CCS Directive for transfer of responsibility from operator to CA

## Requirements:

- All available evidence indicates that the stored CO<sub>2</sub> will be completely and permanently contained:
  - Actual behaviour of the injected CO<sub>2</sub> conforms with the modelled behaviour
  - Absence of any detectable leakage
  - Storage site is evolving towards a situation of long-term stability
- Storage site has been sealed and the injection facilities have been removed

## Obligations transferred:

- All legal obligations relating to monitoring and corrective measures pursuant to the CCS Directive
- Surrender of allowances in the event of leakages pursuant to Directive 2003/87/EC
- Preventive and remedial action pursuant to Articles 5(1) and 6(1) of Directive 2004/35/EC

# Complete & permanent containment

## 18(2)(a): conformity with models

1. Predictions match observed behaviour within estimated uncertainty ranges and demonstrate that there is no significant risk for future leakage:
  - a) Trapping remains effective over the modelled time-period
  - b) Model realisations that imply a significant risk of future leakage can be rejected with confidence. Sensitivity studies exploring alternative model realisations should be performed and it should be firmly concluded that model realisations that indicate that leakage may occur are improbable.
  - c) Continued need to recalibrate static and dynamic models to achieve an adequate history match is reduced or eliminated
2. Geologic model remains significantly unchanged for 5yrs prior to transfer:
  - a) Significant model changes would be changes that alter the understanding of the storage complex containment performance and corresponding flow, geochemical and geomechanical behaviour in ways that invalidates some of the results of previous risk assessments for the storage project

# Complete & permanent containment

## 18(2)(b): absence of detectable leakage

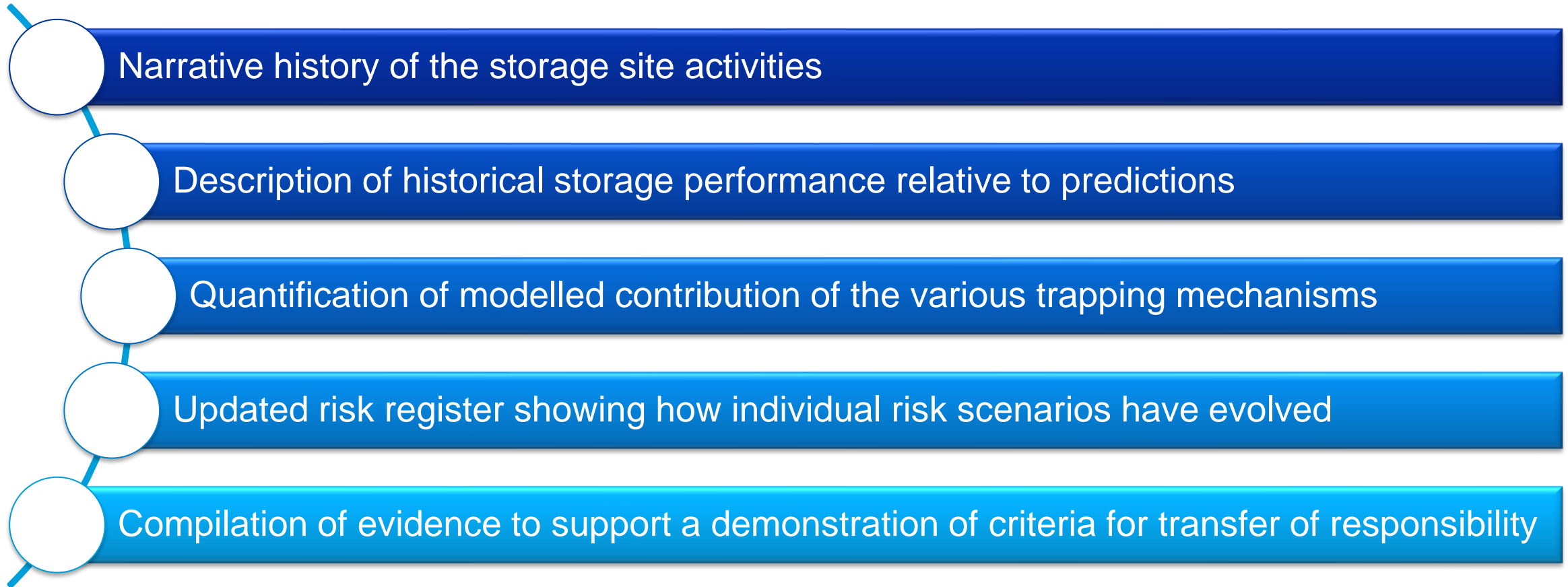
1. No *detected* leakage for a 10-year period immediately before the time of transfer:
  - a) Detectable = can be detected by observations based on the approved monitoring plan or can be inferred from modelling that is conforming to monitoring data
2. Approval of monitoring plan implicitly gives approval of an accepted detectability limit
3. Determination of leakage should be established relative to a pre-project baseline, or if leakage has occurred, a baseline representing the state of the environment 10 years prior to the evaluation of conformance with this Article 18(2)(b)

# Complete & permanent containment

18(2)(c): evolution towards long term stability

1. Continued evolution of CO<sub>2</sub> plume, pressure and geochemical reactions do not imply significant risk of future leakage or negative effects to human health or environment:
  - a) E.g., Continued evolution of plume should not encounter new potential leakage pathways for which confidence in barriers to leakage has not been firmly established, such as legacy wells without necessary verified well barriers
2. Key monitored parameters (including plume, pressure and well integrity) are within a predetermined range to the future stable values or trend, i.e., conforming with item 1 above

# Transfer report



# 18(1)(b) minimum period for post-closure monitoring

- Directive: the post-closure pre-transfer phase should be at least 20 years, unless the CA is convinced that all available evidence indicates that the stored CO<sub>2</sub> will be completely and permanently contained before the end of that period
- Guidance to facilitate a possible handover prior to the end of a 20-year period following closure:
  - Operator specifies in the post-closure plan *quantitative key performance indicators (KPIs)* used to measure compliance with the criteria for transfer
  - Discuss and agree indicators with the CA as part of the evaluation of the provisional post-closure plan.
  - The quantitative KPIs should:
    - Be based on the site-specific context
    - Consider the evolution of containment risk over time
    - Consider the effect of modelling/monitoring uncertainty on constraining residual leakage risk

# Example: KPIs

- Difference (e.g., root mean square error) between modelled CO<sub>2</sub> plume extent from previous model realisation and the most recent history matched realisation is less than X%
  - Links to “Predictions match observed behaviour within estimated uncertainty ranges” and “Continued need to recalibrate static and dynamic models to achieve an adequate history match is reduced or eliminated”
- The modelled contribution of trapping mechanisms is within X% of those estimated in the most recent post-closure plan
- High confidence in integrity of all X wells that may be exposed to CO<sub>2</sub> in the future
- Spill-point uncertainty: safe distance to spill-point based on suite of model realisations
- Pressure at critically stressed faults has dropped X bar since end of injection



# 18(1)(d) site sealing & removal of injection facilities

- The updated post-closure plan should contain details on how a site should be sealed and how injection facilities at the site should be removed
- The CCS Directive does not explicitly specify any requirements to removal of monitoring facilities
- The CA may decide or request that certain monitoring facilities or wells are not removed or sealed, for the purpose of enabling the CA to use these facilities for post-transfer monitoring
- Requirements to be considered when determining if the site has been properly sealed:
  - Any well whose responsibility sits with the operator and penetrates the storage complex that will not be used for post-transfer monitoring should be sealed using appropriate best practices and materials
  - Determination of monitoring facilities to be maintained beyond the transfer should weigh the potential contribution to leakage risk (e.g., penetrations of the seals) against the risk reduction potential

# Thank you

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