



# Task Force to Review and Identify Standards for CO<sub>2</sub> Storage Capacity Estimation

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# Team Members

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# Sources of Inconsistency and Confusion of Previous CO<sub>2</sub> Storage Capacity Estimates - Phase 1 -



- Lack of clear and accepted definitions
- Failure to account for and specify different time and spatial scales
- Failure to recognize and identify assessment types
- Lack of consistent and accepted methodologies
- Lack of proper documentation of used methods and data
- Lack of recognition that, as new data become available and methods improve, estimates become more accurate and change



# Structure of Phase 2 Report

1. Introduction
2. Summary of Phase 1 Findings
3. Estimation of CO<sub>2</sub> Storage Capacity in Coal Beds
4. Estimation of CO<sub>2</sub> Storage Capacity in Oil & Gas Reservoirs
5. Estimation of CO<sub>2</sub> Storage Capacity in Deep Saline Aquifers
6. Conclusions
7. Recommendations

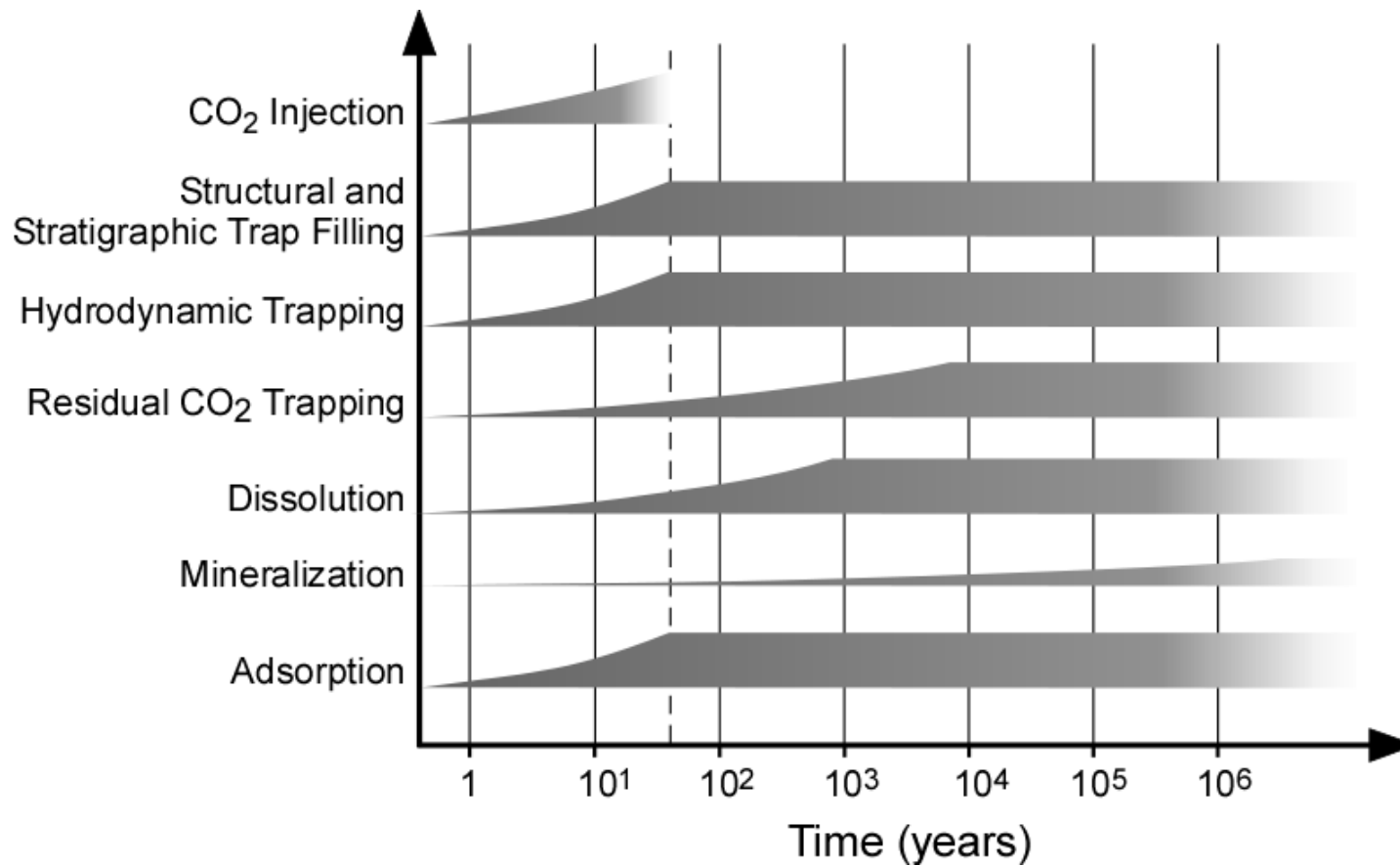


# Key Concepts

- Various process time scales
- Different assessment spatial scales
- Different assessment types
- Geological media considered:
  - uneconomic coal beds,
  - oil & gas reservoirs, and
  - deep saline aquifers



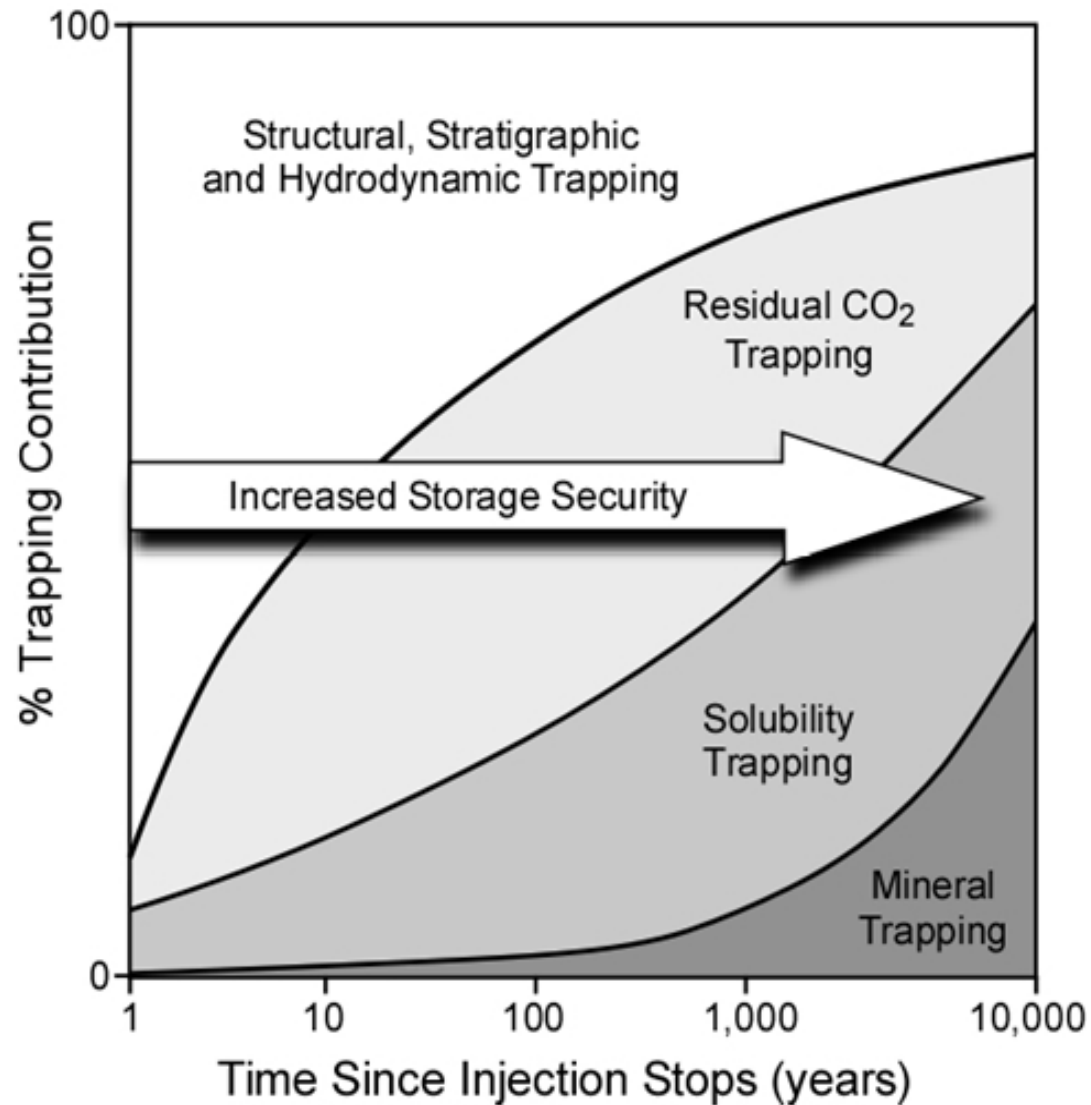
# Process Time Scales



(from IPCC SRCCS, 2005)



# Contribution and Storage Security of Various Trapping Mechanisms



(from IPCC SRCCS, 2005)



# Assessment Scales and Resolution

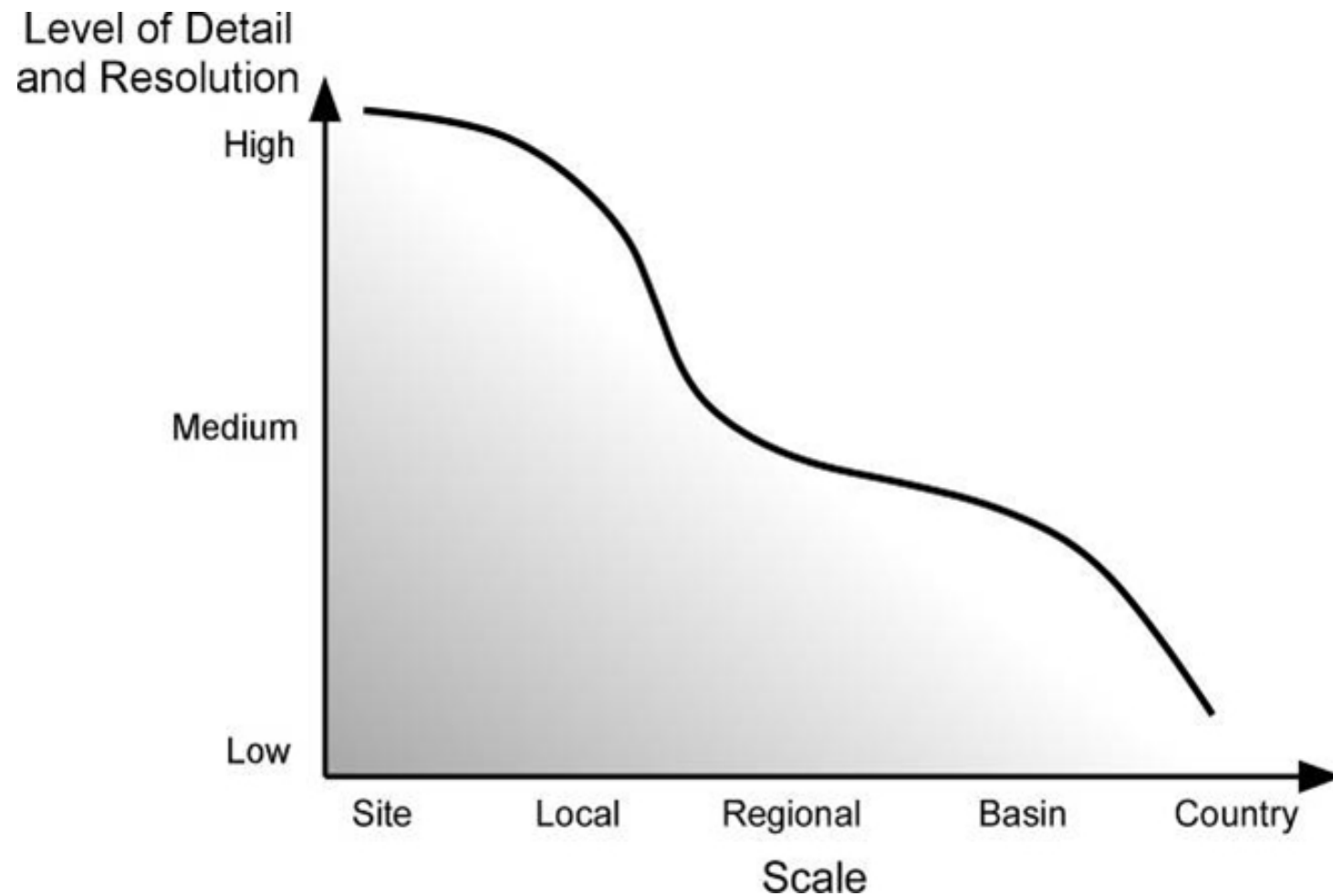
- **Country:** high level, minimal data
- **Basin:** identify and quantify storage potential
- **Regional:** increased level of detail, identify prospects
- **Local:** very detailed, pre-engineering site selection
- **Site:** engineering level for permitting, design and implementation

Note: Depending on the size of a country in relation to its sedimentary basin(s), the order of the top two or three may interchange





# Relationship Between Assessment Scale and Level of Detail and Resolution

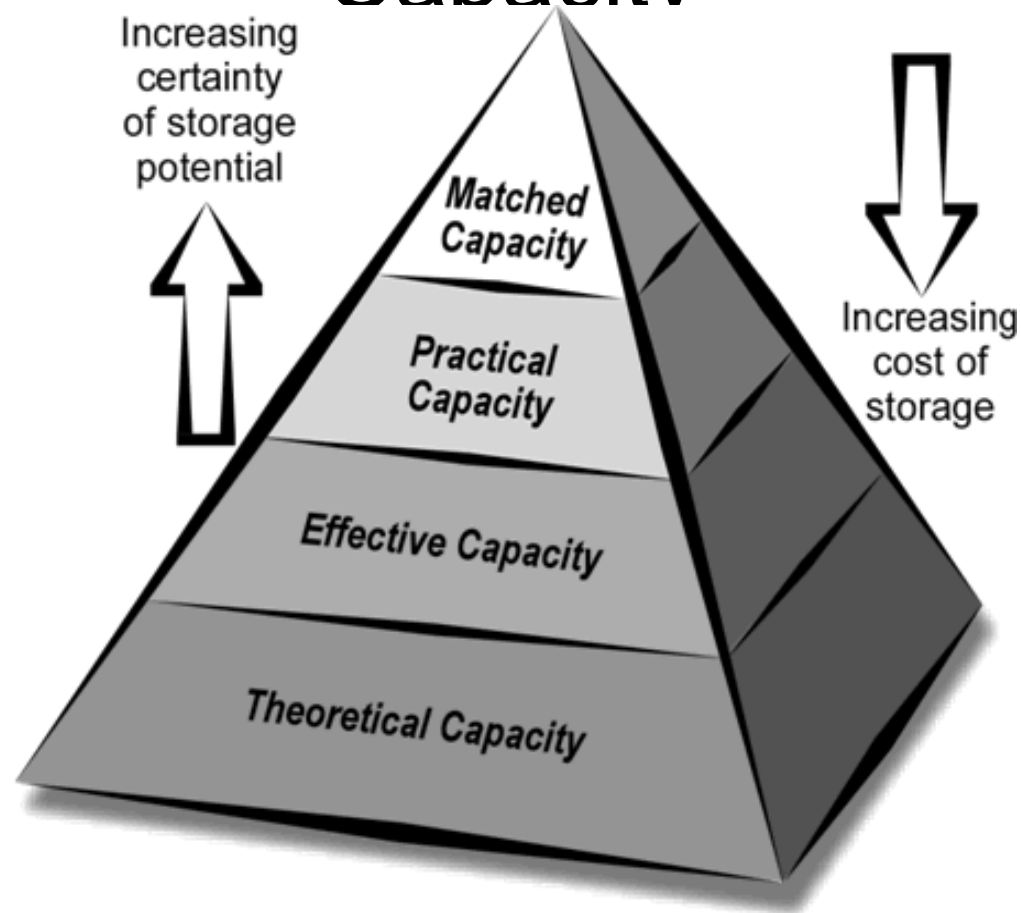




# Assessment Types

- **Theoretical:** physical limit of the system
- **Effective:** accounts for geological and engineering cut-offs
- **Practical:** accounts for technical, legal and regulatory, infrastructure and economic barriers
- **Matched:** obtained by source-sink matching (SSM)

# Techno-Economic Resource-Reserves Pyramid for CO<sub>2</sub> Storage Capacity





# Applicability of Methodologies for Estimating CO<sub>2</sub> Storage Capacity to Various Assessment Scales

Storage Mechanism	Trapping Mechanism	Temporal Nature <sup>1</sup>	Coefficients Needed <sup>2</sup>	Assessment Scale				
				Country	Basin	Regional	Local	Site-Specific
Oil & Gas Reservoirs	Stratigraphic and Structural	No	Yes	√	√	√	√	√
	Enhanced Oil Recovery	No	Yes	-	-	-	√	√
Coal Beds	Adsorption	No	Yes	√	√	√	√	√
Deep Saline Aquifers	Stratigraphic and Structural	No	Yes	√	√	√	√	√
	Residual Gas	Yes	?	-	-	-	√	√
	Solubility	Yes	Yes	-	-	-	√	√
	Mineral Precipitation	Yes	Yes	-	-	-	√	√
	Hydrodynamic	Yes	Yes	-	-	-	√	√

<sup>1</sup> – A trapping mechanism has a temporal nature if the physical or chemical storage process continues after cessation of injection

<sup>2</sup> – Various coefficients need to be estimated to cascade the storage capacity estimate down from theoretical to effective and to practical. These coefficients have to be determined based on field experience and/or numerical simulations



# Potential Subjects for Phase 3

1. Coordination of methodology for CO<sub>2</sub> storage capacity estimation with other national and international working on this subject, including the Geologic Working Group of the USDOE Regional Carbon Sequestration Partnership Program. This work may include further development and refinement of the Resource Pyramid for CO<sub>2</sub> storage capacity.
2. Compilation of representative case-studies of CO<sub>2</sub> storage capacity estimation at various scales and in different geological settings, including compilation of data on various coefficients that are used in CO<sub>2</sub> storage capacity estimations.
3. Provision of support to the Task Force on Capacity Building in training and applying the methodologies for estimating CO<sub>2</sub> storage capacity along the full chain from country-scale to site-scale, and from theoretical to matched capacity, to one or more developing economies in CSLF .