Categories	Subcategories		Components	Designations
Reservoir Suitability	Reservoir Quality	1.	Reservoir Porosity	The percentage of pore volume or void space, or that volume within reservoir rock that can contain fluids (Schlumberger, 2025).
		2.	Reservoir Permeability	The ability, or measurement of a rock's ability, to transmit fluids, typically measured in darcies or millidarcies (Schlumberger, 2025).
		3.	Depositional Environment, Lithology, Grainsize, and Sorting	Geologic setting in which rock was deposited (if sedimentary), lithologic, or mineral qualities of the rock, size of grains within the rock, and sorting of grains within the rock combined to determine the quality of internal reservoir characteristics.
		4.	Diagenesis, Grain Scale Deformation, Secondary Alteration, Reservoir Fractures	Impact of alteration and reservoir fractures on pore space, connectivity, and resulting injectability.
	Reservoir Geometry	5.	Reservoir Thickness Distribution, Spatial Extent, and Lateral Variability	Spatial variability of reservoir, thickness distribution, connectedness, and impact on development.
		6.	Reservoir Internal Variability, Geobody Architecture, and Net- to-Gross	Reservoir internal variability, including geobody architecture and net-to-gross impact storage volume and developability.
		7.	Depth to Top of Formation	Formation top depth relative to 800 m, which is the approximate depth at which CO ₂ enters supercritical state. Assumes feasible drilling depths.
	Reservoir Conditions	8.	Reservoir Temperature	Reservoir temperature relative to drilling requirements and technology.
		9.	Reservoir Pressure	Reservoir pressure relative to drilling requirements and technology.
		10.	In-situ Fluids, Salinity, and CO ₂ Density	Reservoir fluid types and total dissolved solid (TDS) values relative to 10,000 mg/L.
Retention and Geomechanical Risk	Seals and Pressure	11.	Proven / Demonstrated Effectiveness of Top Seal	Seal viability and effectiveness of layer to act as a barrier either through proven or demonstrated effectiveness either in situ or analogously.
		12.	Top Seal Thickness and Spatial Variability	Sufficiency of seal thickness and spatial extent to ensure viability for containment of fluids within the reservoir.
		13.	Top Seal Viability, Fracture Pressure, Lithology, Porosity, and Permeability	Porosity, permeability, lithology, CO ₂ breakthrough pressure, and sealing capability of top seal.

		14.	Secondary Confining Unit Presence and Viability	Presence and sealing capability of additional potential sealing units within the geologic system to prevent CO ₂ travel beyond the reservoir interval.
		15.	Bottom Seal, Downward Flow, and Induced Seismicity	Downward flow potential, impact on long term storage, and risk for induced seismicity in the basement.
		16.	Pressure Communication with Reservoir	Trend of pressure gradients above and below reservoir and communication with reservoir.
	Trap	17.	Geological Trap Type and Certainty	Geological trap type (anticlinal, structural, stratigraphic, combination), three- dimensional configuration, and certainty. Geologic trap considerations are one component of CO ₂ trapping along with the other trapping mechanisms: residual, solubility, and mineral.
		18.	Trap Viability and Previously Demonstrated Integrity	Trap geometry relative to potential leakage pathways and other three- dimensional trap information needed to understand integrity.
	Faulting	19.	Fault Presence, Depth, Spacing, Magnitude, Status (Active vs. Inactive)	The depth, size, spacing, and status of geologic faults. Including the type of fault, three-dimensional orientation, total fault length, and location relative to the reservoir and seal intervals.
		20.	Fracture Type and Density	Fracture presence and offset in both reservoir and seal.
		21.	Fault Reactivation likelihood with Increased Pressure	Reactivation potential of faults and fractures with increased pressure, fault orientation relative to horizontal principal stress.
		22.	Fault Gouge and Cementation and Fault Seal Viability	Transmissibility of fault gouge and fault cement to understand whether faults are sealing or have the potential to act as fluid conduits.
		23.	Earthquake Prevalence and Likelihood	Tectonic activity level of the area and earthquake likelihood.
Hazards	Subsurface Hazards	24.	Overburden Drilling Hazards	Hazards in the overburden such as over pressure, hydrocarbons, tar, salt.
		25.	Pre-existing Well Density, Depths, and Ages	Density of well spacing, depths, and ages of pre-existing wells in the vicinity of the reservoir to understand their utility for reuse or risks as potential leakage pathways.
		26.	Depth and Certainty of Drinking Water Aquifers in Overburden	Overburden aquifer depth, pressure, water quality, and depth certainty, including underground sources of drinking water (USDW), which either currently supply a public water system or contains sufficient groundwater to do so.

	Surface Hazards	27.	Water Depth (if offshore)	Water depth, or distance between the water surface and the seafloor, contributes to the hazard level of operations and relative to drilling feasibility.
		28.	Topography and Location Risks	Surface shape and condition, such as bathymetry, topography, landslides, slope, and turbidity paths.
		29.	Climate and Weather	Hazards posed to site and operations by weather and climate conditions such as hurricanes, monsoons, and extreme temperatures etc.
		30.	Natural Hazards - Land Surface or Seafloor Hazards	Natural hazards on the surface such as permafrost, soil, bedrock, volcanos, hydrocarbon seeps, hydrates etc.
		31.	Infrastructure Hazards	Man made hazards and/or infrastructure on the surface, both public and energy related.
Siting, Regulatory, and Jurisdictional Feasibility	Land Rights and Use	32.	Surface - Land Ownership and Access	Land ownership, access, and rights. The legal rights and control of an individual piece of land or area.
		33.	Subsurface Pore Space Rights	Pore space rights, ownership and usage of the space available for fluids in the subsurface.
	Population and Habitats	34.	Protected Areas and Sensitive Habitats	Proximity to protected areas, sensitive habitat, or sensitive species.
		35.	Population Density	Site location relative to population density and shared resources including air/water.
	Jurisdiction	36.	Jurisdictional Boundaries, Support, and Stability	Jurisdictional boundaries and sentiment of the area, level at which policy and regulation are enacted. Ability of community to organize and influence legislation, regulate their jurisdiction, and interest / engagement level of community.
		37.	Governmental Policies and Incentives	Level and status of governmental policy incentives for the project (both state and national).
	Regulatory	38.	Maturity of Regulatory Framework	Level of maturity of subsurface drilling regulatory body in the region.
		39.	Maturity of CCS Activity in Area	History of permitted GCS activities or related activities in local area.
Community Metrics	Alignments	40.	Familiarity with CCS and/or Drilling Process	Community perspective towards GCS and/or subsurface drilling.

	41.	Industrial Development	Community perspective toward industrial development generally.
	42.	Energy Growth	Community perspective on energy use and growth of energy resources.
	43.	Engagement History and Activity	Level of interest and engagement of community, history of engagement, and the number of organizing bodies.
Considerations	44.	Potential Impact of Operations	Operational conditions in the surrounding area such as air quality, noise and light pollution.
	45.	Infrastructure and Resources	Infrastructure and resources such as water use, materials use, road traffic and road damage, infrastructure reuse/repurposing, and produced water.
	46.	Socioeconomics	Demographics, literacy levels, poverty levels, and human health.
	47.	Workforce and Job Creation	Potential for local job creation and workforce development.

References:

Schlumberger Energy Glossary. 2025. https://glossary.slb.com/en/

Citation: Julia Mulhern, MacKenzie Mark-Moser, Gabriel Creason, Casey White, Araceli Lara, Neyda Cordero Rodriguez, Zach Jackson, Paige Morkner, Kelly Rose, Carbon Storage Technical Viability Approach (CS TVA) Matrix, 5/13/2025, https://edx.netl.doe.gov/dataset/carbon-storage-technical-viability-approach-cs-tva-matrix, DOI: 10.18141/2539979