ReadMe file for Carbon Storage Technical Viability Approach (CS TVA) Matrix

Summary

The Carbon Storage Technical Viability Approach (CS TVA) Matrix is a knowledge framework that classifies the type and relationships between data and information for geologic carbon storage. The CS TVA Matrix contains 5 categories, which represent 14 sub-categories, or 47 components. This framework can be leveraged to assess the availability of data and information needed for a carbon storage project. The information categories of the matrix are tied to a list of required data using weighted mapping, published herein.

Dataset Name: Carbon Storage Technical Viability Approach (CS TVA) Matrix

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

Description:
The Carbon Storage Technical Viability Approach (CS TVA) Matrix is a knowledge framework developed to outline the information needed for geologic carbon storage. The CS TVA Matrix contains 5 categories, which represent 14 sub-categories, or 47 components. This framework can be leveraged to assess the availability of data and information needed for a carbon storage project. The information categories of the matrix are tied to a list of required data using weighted mapping, published herein.

This matrix has been leveraged to assess data availability using the CS TVA Data Availability Workflow leveraging the CS TVA Database v2.0. The database can be found here:

CS TVA Database Citation: Julia Mulhern, Casey White, Araceli Lara, Neyda Cordero Rodriguez, Zachary Jackson, Jacob Shay, Gabriel Creason, MacKenzie Mark-Moser, Paige Morkner, Kelly Rose, Carbon Storage Technical Viability Approach (CS TVA) Database, 3/26/2025, https://edx.netl.doe.gov/dataset/edx4ccs-carbon-storage-technical-viability-approach-database , DOI:10.18141/1984655

The initial results from that data availability assessment can be found here:

CS TVA Data Availability Results Database Citation: Gabriel Creason, Zach Jackson, Neyda Cordero Rodriguez, Julia Mulhern, Casey White, Araceli Lara, MacKenzie Mark-Moser, Paige Morkner, Kelly Rose, Carbon Storage Technical Viability Approach (CS TVA) Data Availability Results Database, 3/27/2025, https://edx.netl.doe.gov/dataset/carbon-storage-technical-viability-approach-cs-tva-data-availability-results-database, DOI:10.18141/2538557

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Carbon Storage Technical Viability Approach Matrix

Categories	Subcategories		Components
Reservoir Suitability	Reservoir Quality	1.	Reservoir Porosity
		2.	Reservoir Permeability
		3.	Depositional Environment, Lithology, Grainsize, and Sorting
		4.	Diagenesis, Grain Scale Deformation, Secondary Alteration, Reservoir Fractures
	Reservoir Geometry	5.	Reservoir Thickness Distribution, Spatial Extent, and Lateral Variability
		6.	Reservoir Internal Variability, Geobody Architecture, and Net-to-Gross
		7.	Depth to Top of Formation
	Reservoir Conditions	8.	Reservoir Temperature
		9.	Reservoir Pressure
		10.	In-situ Fluids, Salinity, and CO_2 Density
Retention and Geomechanical Risk	Seals and Pressure	11.	Proven and Demonstrated Effectiveness of Top Seal
		12.	Top Seal Thickness and Spatial Variability
		13.	Top Seal Viability, Fracture Pressure, Lithology, Porosity, and Permeability
		14.	Secondary Confining Unit Presence and Viability
		15.	Bottom Seal, Downward Flow, and Induced Seismicity
		16.	Pressure Communication with Reservoir
	Trap	17.	Geological Trap Type and Certainty
		18.	Trap Viability and Previously Demonstrated Integrity
	Faulting	19.	Fault Presence, Depth, Spacing, Magnitude, Status (Active vs. Inactive)
		20.	Fracture Type and Density
		21.	Fault Reactivation likelihood with Increased Pressure
		22.	Fault Gouge and Cementation and Fault Seal Viability
		23.	Earthquake Prevalence and Likelihood
Hazards	Subsurface Hazards	24.	Overburden Drilling Hazards
		25.	Pre-existing Well Density, Depths, and Ages
		26.	Depth and Certainty of Drinking Water Aquifers in Overburden
	Surface Hazards	27.	Water Depth (if offshore)
		28.	Topography or Location Risks
		29.	Climate and Weather
		30.	Natural Hazards - Land Surface or Seafloor Hazards
		31.	Infrastructure Hazards
		32.	Surface - Land Ownership and Access

Siting, Regulatory, and Jurisdictional Feasibility	Land Rights and Use	33.	Subsurface Pore Space Rights
	Population and Habitats	34.	Protected Areas and Sensitive Habitats
		35.	Population Density
	Jurisdiction	36.	Jurisdictional Boundaries, Support, and Stability
		37.	Governmental Policies and Incentives
	Regulatory	38.	Maturity of Regulatory Framework
		39.	Maturity of CCS Activity in Area
Community Metrics	Alignments	40.	Familiarity with CCS and/or Drilling Process
		41.	Industrial Development
		42.	Energy Growth
		43.	Engagement History and Activity
	Considerations	44.	Potential Impact of Operations
		45.	Infrastructure and Resources
		46.	Socioeconomics
		47.	Workforce and Job Creation