



CCUS Regulatory Handbook



by/ **TOM DONAHO**

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A resource to help project stakeholders and policymakers navigate evolving regulations

Carbon capture, utilization and storage is primed to play a crucial role in setting the global energy system on a path to net zero. Indeed, CCUS offers one of the few proven tools capable of reducing emissions in the carbon-intensive manufacturing and heavy industry sectors of the economy. As a result, the United States has endeavored to incentivize investment in large-scale CCUS projects through substantial financial incentives such as the 45Q tax credit. More recently, the Biden administration and Congress have taken steps to promote the deployment of CCUS technology through the Infrastructure Investment and Jobs Act, which allocates billions of dollars for the industry, and the Inflation Reduction Act of 2022, which further enhances the 45Q tax credit.

However, successful deployment of CCUS relies on the establishment of regulatory and legal frameworks that both ensure the safe deployment of CCUS technology and provide security to potential project stakeholders. As such, both the federal government and state legislatures have mobilized to create regulatory environments that incentivize deployment of capital to CCUS projects. For example, the Council on Environmental Quality recently issued new guidance on the responsible deployment of CCUS technologies and formed a task force to provide recommendations to the federal government on how to ensure that CCUS projects, such as carbon dioxide pipelines, are permitted in an efficient manner, reflect the input and needs of a wide range of stakeholders, and deliver benefits rather than harm to local communities. Additionally, numerous states have passed comprehensive CCUS legislation designed to address areas of regulatory and legal uncertainty, including CO₂ ownership, long-term liability, unitization, pore space ownership and mineral rights primacy.

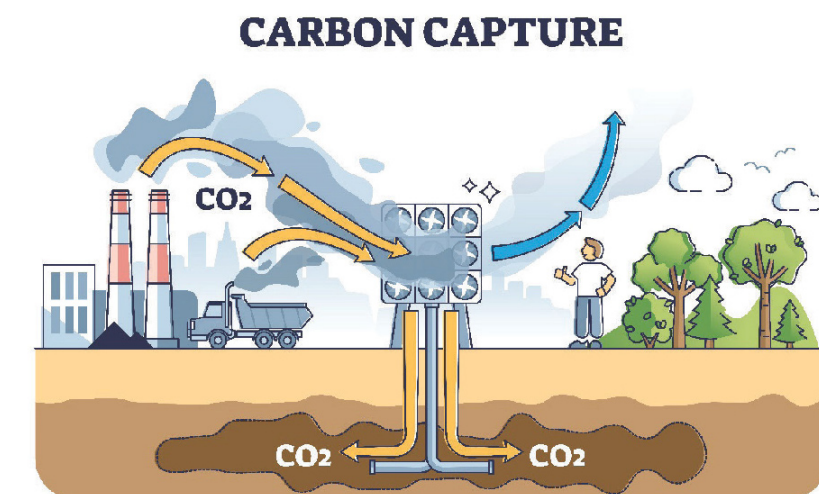
This CCUS Regulatory Handbook is intended to serve as a resource for both CCUS project stakeholders and policymakers in navigating the rapidly changing regulatory environment around CCUS activities.

CCUS SUMMARY

What is Carbon Capture, Utilization and Storage?

Carbon capture, utilization and storage — also referred to as carbon capture, utilization and sequestration — is a collective term used to describe methods and technologies employed to capture CO₂ emissions from industrial and energy-related sources and either utilize it or store it permanently. CO₂ capture and storage technology has been employed for decades to separate marketable gases during the course of industrial processes, including as an integral part of oil and gas operations. Once separated from other gases, CO₂ can be compressed, transported through pipelines or by trucks, and injected into porous rock formations for permanent storage. Emerging technologies and research suggest that CO₂ can also be stored in deep saline aquifers and in the ocean through direct release into an ocean water column or onto the deep seafloor.

However, underground sequestration of captured CO₂ is by no means the only option. Once CO₂ is captured, the opportunities for utilization are myriad. Captured CO₂ can be repurposed or converted for the creation of biological products, plastics, refrigerants, carbonated beverages, fertilizer, agricultural products, nutraceuticals, cosmetics, biofuels and a wide variety of chemicals. In addition to the creation



of commercial products and commodities, captured CO₂ can also be recycled for use in the course of oil, gas and ethanol production.

How Does Industrial Carbon Capture Work?

The most costly segment of a carbon capture and storage project is the development of carbon capture infrastructure, which can account for up to 75% of project cost.¹ Although carbon capture technology is changing every day, there are presently three primary methodologies for capturing carbon from large industrial facilities: post-combustion capture, pre-combustion capture and oxy-fuel combustion capture.²

The process of post-combustion capture involves extracting CO₂ from flue gas — the mix of gases produced that goes up the exhaust stack — following combustion of fossil fuels or biomass. Several technologies, some involving absorption using chemical solvents, can be used to capture large quantities of CO₂

from flue gases.³ The process of pre-combustion capture separates CO₂ from fuel by combining the fuel with air and/or steam to produce hydrogen for combustion and a separate CO₂ stream that can be stored.⁴ The process of oxy-fuel combustion capture uses pure oxygen instead of air for combustion and produces a flue gas that is mostly CO₂ and water, which are easily separable.⁵

What is Direct Air Capture?

Some of the most promising emerging technologies in carbon capture allow CO₂ to be captured directly from the atmosphere. Direct air capture is a technology that uses chemical reactions to pull CO₂ from the atmosphere. When atmospheric air moves over or through the chemicals, the chemicals react with and trap CO₂, while allowing the other components of the air to pass through. Most DAC systems today utilize either liquid solvents or solid sorbents. Once CO₂ is captured from the

1 National Petroleum Council, Meeting the Dual Challenge: A Roadmap to At-Scale Deployment of Carbon Capture, Use and Storage, Chapter 5, July 17, 2020.

2 CRS R44902, Carbon Capture and Sequestration in the United States, Oct. 18, 2021, pgs. 4-6.

3 Id.

4 Id. at 5.

5 Id. at 6.

Estimates of the U.S. Storage Capacity for CO₂(in billions of metric tons)⁶

	Low	Medium	High
Oil and Natural Gas Reservoirs	186	205	232
Unmineable Coal	54	80	113
Saline Formations	2,379	8,328	21,633
Total	2,619	8,613	21,978

atmosphere, DAC systems typically apply heat to release the CO₂ from the solution or sorbent so they can be reused in the process. The captured CO₂ can then be injected underground for sequestration in geologic formations or used in various products or applications. This method of carbon capture is currently the most expensive, though costs of implementation are expected to decrease significantly with technological advances.

How is CO₂ Transported?

After CO₂ is captured, the gas is purified and compressed for transportation. Transport of CO₂ occurs daily throughout the United States, though transportation infrastructure remains limited. Pipelines are the most common method for transportation of CO₂ in the United States and will likely remain so into the foreseeable future. There are thousands of miles of CO₂ pipelines in the United States, though many of those pipelines terminate at oil fields. Transporting CO₂ via pipeline is similar to transporting natural gas and oil in that monitoring and protection against compromise due to overpressure is required.

Although there currently exist regional pipeline structures capable of transporting CO₂, the scale of pipeline infrastructure needed to

support long-term CCUS deployment throughout the United States is significant. Transport of CO₂ by truck, rail and ship is also possible for smaller quantities of CO₂. However, these methods of transportation can cost almost twice as much as transportation by pipeline.

Where Can CO₂ be Stored?

There are presently three types of geological formations commonly considered for underground sequestration: depleted oil and natural gas reservoirs, deep saline reservoirs and unmineable coal seams. CO₂ must be injected into porous rock formations in a supercritical state. Injection into reservoirs usually occurs at depths greater than 800 meters.

Capacity for CO₂ storage in the United States is significant. The Department of Energy has estimated the total storage capacity ranges between about 2.6 trillion and 22 trillion tons of CO₂.

Proliferation of CCUS Projects and Regulatory Schemes

There are nearly 100 commercial CCUS facilities in development or operation within the United States and more than 200 worldwide.⁶ This represents a marked increase over the past 10 years. Much

of the increased commercial commitment to CCUS derives from the 2015 Paris Agreement and resulting national commitments to develop CCUS-supportive policies in furtherance of climate change goals. To that end, the U.S. federal government and various states have developed both financial incentives and regulatory frameworks to facilitate the development of CCUS projects.

This CCUS Handbook is intended to serve as a resource for individuals and entities in the industry seeking updated information on a rapidly changing regulatory landscape.

REGULATORY AND PERMITTING FRAMEWORK

CCUS projects are diverse, often combining several complex undertakings such as capture, transport and storage. Therefore, generalizing about permitting and regulatory interactions is difficult. The precise complement of permits and reviews necessary for any given project will be specific to the details of that project. Still, in most cases, numerous private, local, state, tribal and/or federal agencies will be involved in responding to authorizing requests for CCUS projects.

Federal Regulatory and Permitting Framework

Deployment of carbon-capture technology requires standards that both provide regulatory certainty for project stakeholders and protect the public health and environment. A much-needed regulatory framework is beginning to take shape in the United States through a combination of preexisting regulatory schemes and newly enacted review processes.

The Environmental Protection Agency has a regulatory framework that was finalized in 2010 under the authorities of the Safe Drinking

⁶ Global CCS Institute, Facilities Database; See Index 1; Global CCS Institute 2022 Status Report: status22.globalccsinstitute.com/2022-status-report/global-status-of-ccs

Water Act and the Clean Air Act that regulates underground injection control programs and ensures the long-term, safe geologic sequestration of CO₂. The EPA also provides guidance to support state program implementation of UIC programs.⁷ This includes minimum requirements for state UIC programs and permitting for injection wells. These requirements include standards for well construction, operation and maintenance, monitoring and testing, reporting and recordkeeping, site closure, financial responsibility and post-injection site care. The EPA has issued regulations for six classes of underground injection wells based on type and depth of fluids injected and potential for endangerment of underground sources of drinking water. Class II wells are used to inject fluids relating to oil and gas operations, including with respect to the injection of CO₂ for enhanced oil recovery, while Class VI wells are used for the express purpose of injecting CO₂ for geologic sequestration. However, Class II EOR wells may subsequently be permitted as Class VI wells in certain circumstances, including where there exists increased risk to USDWs.

The Consolidated Appropriations Act, enacted in December 2020, allows CCUS projects to be designated as covered projects under Title 41 of the Fixing America's Surface Transportation Act, a statutory program designed to improve the timeliness, predictability and transparency of the federal environmental review and authorization process for select infrastructure projects. As such, projects for the development of CCUS project infrastructure, including construction of any facility, technology or system that captures, utilizes or sequesters



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CO₂ emissions, are now covered under FAST-41. FAST-41 covered projects are subject to coordinated federal agency review and permitting supervised by the Federal Permitting Improvement Steering Council.

Additionally, the Utilizing Significant Emissions with Innovative Technologies Act, included in H.R. 133 (116th Congress), directs the chair of the CEQ to prepare a report on CCUS, with a particular focus on identifying and inventorying existing permitting requirements, including best practices to advance the efficient, orderly and responsible development of CCUS projects at increased scale.⁸ Pursuant to this directive, with input from the EPA, the DOE, the Department of the Interior, the Department of Transportation, the Federal Permitting Improvement Steering Council, and other relevant agencies, the CEQ drafted a report containing an inventory of existing federal statutes and regulations that could

potentially apply to a CCUS project, including CO₂ pipelines.

That report, issued on June 21, 2021, and titled "Council on Environmental Quality Report to Congress on Carbon Capture, Utilization, and Sequestration," identifies numerous permits and/or actions that may be required for the development of a CCUS project, including:⁹

- Clean Air Act New Source Review preconstruction permit (EPA).
- Clean Air Act Title V operating permit (EPA).
- Underground injection control permit — Class II for CO₂-EOR and Class VI for geologic sequestration.
- National Pollutant Discharge Elimination System permit for water discharge.
- Marine Protection, Research and Sanctuaries Act permit for marine environs.

7 40 CFR §§144-147.

8 Council on Environmental Quality Report to Congress on Carbon Capture, Utilization and Sequestration.

9 Id., at pgs. 32-33.

- Outer Continental Shelf Lands Act permit.
- Environmental assessment or environmental impact statement under the National Environmental Policy Act.
- Permit for right of way through federal lands from secretary of governing agency.
- Consultations with Fish and Wildlife Service pursuant to Endangered Species Act.
- Compliance with National Historic Preservation Act.
- Compliance with Mineral Leasing Act for geologic sequestration.
- Compliance with Pipeline and Hazardous Materials Safety Administration (PHMSA)

A more complete inventory of potentially relevant federal permits and reviews for CCUS projects, adapted from the 2021 CEQ Report, can be found in Table 1.

State Regulatory and Permitting Framework

In addition to federal permits and permissions, parties seeking to deploy CCUS projects throughout the United States must also navigate an ever-changing landscape of state regulations and laws.

With the industry in its relative infancy, states are just beginning to plan for and implement the kind of comprehensive regulatory frameworks necessary to eliminate the environment of regulatory uncertainty that causes CCUS projects to be delayed or canceled. State laws and regulations concern a wide variety of issues, ranging from liability to property rights to primacy. This section will generally discuss the types of CCUS-related issues state legislatures are addressing across the country and provide an overview of relevant laws and regulations on a state-by-state basis.¹⁰

Liability and Financial Responsibility

One of the principal questions confronting the private sector, including potential sources of equity, is what parties or governmental entities are ultimately responsible for managing short-term and long-term environmental, health and safety risks associated with injecting billions of tons of CO₂ into the ground. The storage of CO₂ in the subsurface raises issues of potential liability should there occur a loss of CO₂ containment and subsequent harm to human health, private property or the environment. Loss of containment may manifest in several ways, including through migration of CO₂ within the subsurface or leakage to the surface, and result in toxicological effects, environmental effects or even induced seismicity. However, one complicating factor in constructing a statutory liability scheme to account for these potential damages is the long tail of a CCUS project. Put simply, the lifetime of private firms is much shorter than the period necessary to ensure public and environmental health protection from CCUS projects. As such, state legislators have sought to develop institutional structures that balance the need to protect against risks inherent to CCUS projects over a long period of time with the desire to support and encourage investment in CCUS projects in furtherance of climate goals. If liability is borne entirely by the private sector, the potential exposure would likely preclude widespread deployment of CCUS projects. However, if the public sector bears the brunt of financial responsibility for future leakage, operators will lack the appropriate incentives to take necessary precautions during active operations and post-closure remediation.

Many states have attempted

to strike the appropriate balance by enacting liability and financial responsibility regulations. While the laws differ, each generally directs the state to assume post-closure care and long-term stewardship responsibilities for CCUS projects once they have been shut down and the operator has demonstrated that the carbon injected has been stored safely for a specific period of time. In some instances, the state has agreed to eventually take on full ownership and long-term liability after a minimum number of years have passed.

However, not all states are willing to accept long-term liability. Kansas, for example, has passed legislation explicitly stating that the state will not assume liability or responsibility to pay any damages resulting from the leak or discharge of CO₂ from any CO₂ injection well or the underground storage of CO₂.

CO₂ Ownership

One way in which states have delineated liability is by explicitly providing that the operator maintains ownership over injected CO₂ for a defined period of time and thus maintains all attendant liability exposure through said ownership interest. A transfer in liability is often concurrent with a transfer to the state of ownership rights in CO₂ injected into the subsurface. Most states that have passed comprehensive CCUS legislation, including, for example, Montana, Wyoming and North Dakota, have specific statutory provisions that govern CO₂ ownership over time.

Pore Space Ownership

The sequestration of CO₂ in subsurface geological formations presents a relatively unsettled and unexplored property law issue — pore space ownership. Pore space refers to space in underground geological

10 Although many states have established minimum requirements for obtaining a permit to drill and/or establish a geologic storage facility, those requirements vary substantially by state and are not detailed in this handbook. Please contact the author if you require more information.

formations that may serve as storage reservoirs for water, natural gases and minerals, including CO₂. These underground spaces are often permeable, naturally occurring formations or underground caverns from which minerals have previously been withdrawn. The DOE has developed a *Carbon Storage Atlas* to provide information on CO₂ storage potential throughout the United States.¹¹ The most recent edition, published in 2015, estimates 2.618 billion metric tons to 21.978 billion metric tons in available pore space suitable for sequestration. These figures suggest that the potential for geological sequestration of CO₂ in the United States is significant and that the primary resource is widely available. But who owns these potentially valuable pore spaces? Many states follow the “American rule” of ownership, which provides that the mineral estate holder maintains ownership interest in only underground mineral resources and not underground geological formations. Other states have adopted the “English rule,” which extends the mineral estate ownership interest to underground pore spaces. Still other states have conflicting case law that provides mineral estate owners little guidance. When federal or state ownership is implicated, the issue is complicated further by the Stock-Raising Homestead Act of 1916, which expressly reserves mineral rights for the federal government for more than 50 million acres across the Western United States. However, the application of SRHA to subsurface pore spaces on federal lands is an open question.

Several Western states — such as Wyoming, North Dakota and Montana — have sought to resolve confusion over pore space ownership, and potentially circumvent SRHA, by passing legislation that endorses the American rule and vests ownership

State	Minimum Number of Years Before Transfer of Liability	Statute
California	100	Ca. Pub. Res. Code §71464
Louisiana	50	La. Stat. Ann. §30:1109
Montana	50	Mont. Code Ann. §82- 11-183(3)(f)
North Dakota	10	N.D. Cent. Code §38- 22-17(4)
Utah	10	Utah Code §40-11-16
West Virginia	10	W. Va. Code §22-11B-12
Wyoming	20	Wyo. Stat. Ann. §35-11- 319(b)



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of pore space in the owner of the surface estate. However, for most states, the question of pore space ownership remains a muddle of common law, prescriptive easements and potential federal preemption. In the absence of regulatory clarity, parties are often left to contract around pore space ownership. However, large-scale deployment of CCUS throughout the United States will require additional state legislatures to step into the regulatory void and provide certainty to project investors and stakeholders. Some states are doing so.

Unitization

States across the nation have declared it to be in the public interest to support and facilitate sequestration of captured CO₂. However, CCUS project stakeholders face a property-rights issue familiar to the oil and gas industry: What happens when property owners don't consent to the use of their property? In the context of oil and gas exploration and development, unitization is an essential tool. The term “unitization” historically refers to the combination of separately owned mineral or leasehold interests

¹¹ netl.doe.gov/sites/default/files/2018-10/ATLAS-V-2015.pdf



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related to a common source such as a reservoir or field to create a joint operation to maximize production and reduce costs of operation. Many states rich in hydrocarbons have passed legislation relating to unitization or can otherwise rely on a body of common law that governs the practice. In the CCUS context, the development of a geologic storage facility often requires the consent of numerous pore space owners. However, unanimous consent is often difficult to obtain. As a result, numerous states have passed legislation establishing a minimum percentage of pore space owners who must consent to a storage project before it is permitted and allowed to proceed. For example, in Montana and North Dakota, at least 60% of the owners of the pore space must consent to the CCUS project, while in Wyoming, at least 80% of pore space owners must consent to the CCUS project before it can proceed. Other states, such as Indiana, require that an operator obtain the consent of the owners of the pore space underlying

a minimum percentage of the surface area above the proposed storage facility. Some states also have provided specific guidelines on compensation for nonconsenting pore space owners.

Storage Funds

One way in which states have attempted to ensure that private industry shoulders the financial burden of long-term management and monitoring for CCUS projects is through the creation of "storage funds." Legislation often earmarks funds from the CCUS project itself, including through project application fees, permitting or operating fees, well closure fees or even a designated contribution amount per metric ton of CO₂ injected. For example, in 2009, Texas instituted the Anthropogenic Carbon Dioxide Storage Trust Fund, an interest-bearing fund that may be used for any of the following:

- Permitting, inspecting, monitoring, investigating, recording and reporting on geologic storage

facilities and associated anthropogenic CO₂ injection wells.

- Long-term monitoring of geologic storage facilities and associated anthropogenic CO₂ injection wells.
- Remediation of mechanical problems associated with geologic storage facilities and associated anthropogenic CO₂ injection wells.
- Repairing mechanical leaks at geologic storage facilities.
- Plugging abandoned anthropogenic CO₂ injection wells used for geologic storage.
- Training and technology transfer related to anthropogenic CO₂ injection and geologic storage.
- Compliance and enforcement activities related to geologic storage and associated anthropogenic CO₂ injection wells.¹²

Funds have been created to address similar costs in other states, including Louisiana, Montana, Wyoming and North Dakota. Storage funds are generally being used as a tool to ensure public and environmental health protection from CCUS projects long after those projects have been completed and their stakeholders have ceased to exist.

Mineral Rights Primacy

Over the decades, many states have developed bodies of law and regulations specifically pertaining to the exploration and withdrawal of mineral resources. This includes regulations and property rights relating to oil and gas. In an effort to protect long-established mineral rights, and in recognition of the importance of protecting mineral right owners' interests, some states have passed legislation that explicitly proclaims the dominance of the severed mineral estate over the pore space estate. In the same vein, some states will only issue a permit if it is shown that the injection and geologic

¹² Tex. Nat. Res. Code §121.003(d).

storage of CO₂ will not endanger any oil, gas or other mineral formation.

Class VI Primacy

As mandated by the Safe Drinking Water Act of 1974, the EPA has promulgated regulations establishing minimum requirements, technical criteria and standards for UIC programs to protect underground sources of drinking water. On Dec. 10, 2010, the EPA finalized minimum federal requirements under the SDWA for underground injection of CO₂, establishing a new class of injection wells, Class VI. The Class VI rule is based on the UIC regulatory framework, with modifications to address the unique nature of CO₂ injection. The purpose of the Class VI rule is to ensure that the geologic storage of CO₂ is conducted in a manner that protects underground sources of drinking water.

Under the SDWA, the EPA can delegate to states its authority to implement and enforce the UIC program upon the state's application to the agency. If a state's primacy application is approved, the state assumes primary enforcement authority over a class or classes of wells. This is commonly referred to as primacy. In order to be granted primacy over Class VI wells, a state must establish that its Class VI regulations are at least as stringent as the federal regulations. If a state does not seek and obtain primacy, the EPA directly implements the UIC program through its regional offices.

State primacy is common in the UIC program. More than 40 states have primacy over at least one class of injection well, including oil and gas (Class II) wells. More than 30 states hold primacy for all classes of injection wells other than Class VI. However, to date, only two states — North Dakota in 2018 and Wyoming in 2020 — have obtained primacy for Class VI wells. The process from application to approval took nearly five years for North Dakota and nine months for Wyoming. Louisiana has had a Class VI primacy application pending since April 2021. Many states have taken legislative action to authorize their agencies to pursue Class VI primacy.

AAPL BUSINESS

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*Awarded in three categories: large, medium and small

OFFICER NOMINATIONS

AAPL's Nominating Subcommittee Committee is now seeking your nominations for the association's 2024-25 Executive Committee Slate of Officers.

The current vice president will be nominated for president, therefore the committee requests nominations for the following positions:

- ▲ First Vice President
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- ▲ Third Vice President
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CALIFORNIA

California is home to deep sedimentary formations that are ideally suited for CO₂ storage, hundreds of carbon-emitting facilities ready for implementation of emerging carbon capture technologies and a history of legislative leadership on climate mitigation issues. As such, California recently passed several carbon capture bills intended to build out a framework for regulation of carbon capture projects within the state.

Issue	Description	Authority
Regulatory Authority	The California Air Resources Board is granted the authority to establish a comprehensive CCUS program that, among other things, includes regulations for a unified permit application for the construction and operation of CCUS projects, tracks the deployment of CCUS technologies, supports methods of utilization and storage, and includes regulations for financial responsibility for CCUS projects.	Cal. Health and Safety Code §39741.1-4*
CO₂ Ownership and Liability	A CO ₂ capture, removal or sequestration project operator shall be liable for any damages caused by the operation of the CO ₂ capture, removal or sequestration project.	Cal. Pub. Res. Code §71462(f)*
Pore Space Ownership	Title to any geologic storage reservoir is vested in the owner of the overlying surface estate unless it has been severed and separately conveyed. A conveyance of the surface ownership of real property shall be a conveyance of any geologic storage reservoir below the surface of the real property unless the ownership interest in the geologic storage reservoir previously has been severed or is explicitly excluded in the conveyance. The ownership of a geologic storage reservoir may be conveyed in the manner provided by law for the transfer of mineral interests in real property. No agreement or instrument conveying a mineral or other interest underlying the surface shall act to convey ownership of a geologic storage reservoir unless the agreement explicitly conveys that ownership interest.	Cal. Pub. Res. Code §71462(a- b)*
Unitization	By July 1, 2025, the secretary of the Natural Resources Agency, in consultation with the state board, must publish a framework for governing agreements regarding two or more tracts of land overlying the geologic storage reservoir. The framework must include a "requirement that agreement proponents own title to at least an undivided three-fourths of the total interests subject to the proposed agreement."	Cal. Pub. Res. Code §71461(a) (2)*
Class VI Primacy	Not granted. The EPA is the primary enforcement authority.	
Storage Fund	Rather than paying into a special purposes fund, California requires that operators maintain financial responsibility "for a period of time that is sufficiently long enough to demonstrate that the risk of CO ₂ leakage poses no material threat to public health, safety, and the environment and to achievement of net zero greenhouse gas emissions in California and that terminates no earlier than 100 years after the last date of injection of CO ₂ into a geologic storage reservoir."	Cal. Pub. Res. Code §71464*
EOR	Operators are prohibited from injecting a concentrated CO ₂ fluid produced by a CO ₂ capture project or a CO ₂ capture and sequestration project into a Class II injection well for purposes of enhanced oil recovery, including the facilitation of enhanced oil recovery from another well.	Cal. Pub. Res. Code §3132(b)*
Notable legislation: S.B. 905 (2022); S.B. 1314 (2022). *Effective Jan. 1, 2023		

INDIANA

As one of the nation's leaders in both ethanol and coal production, Indiana has long been a natural fit for the development of CCUS projects. The state's proximity and access to one of the nation's largest saline aquifers has made investment in such projects even more enticing to investors. In 2019, the Indiana General Assembly passed Senate Bill 442, declaring carbon capture to be in the public interest of the state and establishing a pilot program at the West Terre Haute ammonia production facility. Since then, Indiana has taken further steps to support the development of CCUS and passed legislation establishing a comprehensive regulatory framework for carbon sequestration.

Issue	Description	Authority
Regulatory Authority	The Indiana Department of Natural Resources is granted authority to issue permits and orders in furtherance of regulations relating to the geologic storage of CO ₂ .	Ind. Code §14-39-2-1 et seq.
CO₂ Ownership and Liability	A claim of subsurface trespass shall not be actionable against a storage operator unless the claimant proves that injection or migration of CO ₂ interferes with the comfortable enjoyment of life or property or has caused direct physical injury to a person, an animal or tangible property. Upon completion of a CCUS project, the storage operator may apply for a certificate of completion. Once a certificate of completion is issued, the state of Indiana assumes ownership and responsibility for the storage facility, and the storage operator and the owner of the storage facility are released from responsibility for all regulatory requirements associated with the storage facility and all potential liability associated with the storage facility.	Ind. Code §14-39-2-12 Ind. Code §14-39-2-13
Pore Space Ownership	The ownership of pore space is vested in the surface estate of real property that is divided into a surface estate and a mineral estate unless such rights are explicitly acquired by conveyance document.	Ind. Code §14-39-2-3
Unitization	The storage operator must obtain the consent of the owners of the pore space underlying at least 70% of the surface area above the proposed storage facility. If this threshold is met, the Department of Natural Resources may issue an order requiring all owners to integrate their interests.	Ind. Code §14-39-2-4
Class VI Primacy	Not granted. The EPA is the primary enforcement authority.	
Mineral Rights Primacy	All statutory rights and requirements relating to carbon sequestration are subordinate to "rights pertaining to oil, gas and coal resources" and may not adversely affect such resources. A mineral owner or mineral lessee shall provide written notice to a storage operator at least 31 days prior to drilling a well if the mineral owner or mineral lessee wishes to drill a well not more than 330 feet from the surface location of a well pursuant to a UIC Class VI permit or 500 feet from the uppermost confining zone of a carbon sequestration facility pursuant to a UIC Class VI permit.	Ind. Code §14-39-2-1 Ind. Code §14-39-2-11
Storage Fund	The Carbon Dioxide Storage Facility Trust Fund is a special fund established to defray the costs incurred by the department for the long-term monitoring and management of a carbon sequestration project. Storage operators must provide an annual estimate of the amount of CO ₂ to be injected into a storage facility and pay into the fund a fee of 8 cents per ton of CO ₂ estimated to be injected.	Ind. Code §14-39-2-9 Ind. Code §14-39-2-10
Notable legislation: H.B. 1209 (2022); S.B. 0451 (2023)		

KANSAS

Kansas has a mixture of industrial sectors that produce CO₂ at a commercial scale, including through ethanol plants, nitrogen fertilizer plants, cement plants, and coal power plants/refineries. Kansas oil fields also provide an opportunity for enhanced oil field recovery projects. The Carbon Dioxide Reduction Act, passed more than a decade ago, provides for regulation of CO₂ injection wells and establishes tax incentives for CCUS project stakeholders.

Issue	Description	Authority
Regulatory Authority	The authority to adopt rules and regulations is vested in the Kansas Corporation Commission. It establishes requirements, procedures and standards for the safe and secure injection of CO ₂ and maintenance of underground storage of CO ₂ .	Kan. Stat. Ann. §55-1637
CO₂ Ownership and Liability	The state of Kansas does not assume liability or responsibility to pay any damages resulting from the leak or discharge of CO ₂ from any CO ₂ injection well or the underground storage of CO ₂ .	Kan. Stat. Ann. §55-1641
Pore Space Ownership	Undetermined.	
Class VI Primacy	Not granted. The EPA is the primary enforcement authority.	
Storage Fund	The Carbon Dioxide Injection Well and Underground Storage Fund has been established in order to pay the costs of permitting, testing, repairs, investigations, remedial actions, monitoring, inspections, mitigation, legal costs, and other administrative activities.	Kan. Stat. Ann. §55-1638
Notable legislation: H.B. 2419 (2007); H.B. 2418 (2010).		



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- Regulatory/Notification
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KENTUCKY

As early as 2007, the state of Kentucky recognized the need for research and investment in carbon capture prospects. In coordination with the University of Kentucky Center for Applied Energy Research and a consortium of public and private stakeholders, the state of Kentucky has supported and engaged in substantive research through pilot programs and cooperative research.

Issue	Description	Authority
Regulatory Authority	The Kentucky Division of Oil and Gas within the Department for Natural Resources is authorized to seek primary jurisdiction and authority over matters relating to the geologic storage of CO ₂ in Kentucky once programs have been developed at the federal level. The Energy and Environment Cabinet has been authorized to choose between one and five pilot projects that inject CO ₂ into pore space.	Ky. Rev. Stat. Ann. §353.804(1) Ky. Rev. Stat. Ann. §353.804(2)
CO₂ Ownership and Liability	The storage operator monitors the storage facility for leakage and migration for the time period and by the methods required by the permit for the carbon injection wells after completion of active injection and plugging of the carbon injection wells. After the required period of monitoring following completion and plugging, the ownership and liability for a storage facility may be transferred to the federal government if a federal program exists or the Kentucky Finance and Administration Cabinet if one does not exist. Ownership of and liability for the stored CO ₂ shall remain with the storage operator until the transfer is completed.	Ky. Rev. Stat. Ann. §353.810
Pore Space Ownership	If, after good faith negotiation, the storage operator cannot locate or cannot reach an agreement with all necessary pore space owners but has secured written consent or agreement from the owners of at least 51% of the interest in the pore space for the storage facility, pooling of all pore space included within the proposed storage facility shall be permitted. A pooling order shall authorize the long-term storage of CO ₂ beneath the tract or portion. The order shall also authorize, where necessary, the location of carbon injection wells, outbuildings, roads, monitoring equipment and access to them. The pooling order shall identify the compensation to be paid to unknown, nonlocatable and nonconsenting pore space owners and the basis for valuation of the pooled interest.	Ky. Rev. Stat. Ann. §353.806 Ky. Rev. Stat. Ann. §353.808
Class VI Primacy	Not granted. The EPA is the primary enforcement authority.	
Notable legislation: H.B. 259 (2011).		

LOUISIANA

Louisiana has a long history of carbon capture operations for enhanced oil recovery operations. As a result, the state has developed one of the most extensive networks of pipeline infrastructure in the country to meet carbon transportation needs. Louisiana is also home to numerous coal and gas power plants, gas processing facilities, petroleum refineries, chemical plants and other industrial facilities that may be prime candidates for carbon retrofit based on emissions and estimated capture cost. To capitalize on these conditions, the Louisiana Legislature passed the Louisiana Geologic Sequestration of Carbon Dioxide Act to govern future deployment of CCUS throughout the state.

Issue	Description	Authority
Regulatory Authority	The Louisiana commissioner of conservation is granted jurisdiction and authority to enforce laws relating to the geologic storage of CO ₂ and subsequent withdrawal of stored CO ₂ . Approval of a storage facility by the commissioner requires notice and public hearing.	LSA-R.S. 30:1102-1111
CO₂ Ownership and Liability	A certificate of completion may not be issued until at least 50 years after CO ₂ injections end. Upon issuance of the certificate, the storage operator, all generators of any injected CO ₂ , all owners of CO ₂ stored in the storage facility and all owners otherwise having any interest in the storage facility shall be released from any and all duties, obligations or liability.	LSA-R.S. 30:1109(A)(1)
Pore Space Ownership	Ownership of the pore space is presumed to be vested in the surface estate owner(s).	Common Law
Class VI Primacy	Not granted. The EPA is the primary enforcement authority. Once primacy is granted, the state regulations that will govern Class VI wells can be found in Statewide Order No. 29-N-6.	
Storage Fund	The Carbon Dioxide Geologic Storage Fund has been established to fund operational and long-term inspecting, testing, and monitoring of CCUS sites as well as remediation, plugging and abandoning, repairs, and general administration. The fund shall consist of fees, penalties, and bond forfeitures collected in connection with permitting, private contributions, the contents of site-specific trust accounts — to be used only for each respective site — and fees levied by the commissioner on storage operators. The amount of such fees is determined according to a formula ($F \times 144 < M$) that establishes the fee per ton of CO ₂ over the course of at least 144 months, not to exceed \$5 million.	LSA-R.S. 30:1110
EOR	Use of CO ₂ for enhanced hydrocarbon recovery requires the creation of a unit by the commissioner of conservation for the purpose of secondary or tertiary recovery. A hearing is required before permission is granted.	LSA-R.S. 30:5(C).
Eminent Domain	Storage operators and owners that obtain a certificate of public convenience and necessity from the commissioner may exercise the power of eminent domain over property to acquire surface and subsurface rights and property interests necessary for the purpose of constructing, operating, or modifying a storage facility. A certificate of public convenience and necessity may be issued only after a public hearing.	LSA-R.S. 30:1108 LSA-R.S. 30:1107
Notable legislation: H.B. 661 (2009); H.B. 1220 (2008); H.B. 571 (2023)		

MISSISSIPPI

For decades, Mississippi has benefited from the geologic formation known as the Jackson Dome through enhanced oil recovery operations. The operations have traditionally involved the transportation of CO₂ from the dome by pipeline to oil fields across the South. Now the state is well positioned to utilize that same pipeline as the backbone for a thriving carbon capture and sequestration market. Significant pore space will also bolster the state's carbon sequestration aims.

Issue	Description	Authority
Regulatory Authority	The Mississippi State Oil and Gas Board and the Commission on Environmental Quality have jurisdiction and authority to enforce laws relating to the geologic storage of CO ₂ and subsequent withdrawal of stored CO ₂ . The Mississippi Geologic Sequestration of Carbon Dioxide Act was enacted in 2011.	Miss. Code Ann. §53-11-3(2); §53-11-7
CO₂ Ownership and Liability	The state does not assume liability or responsibility, even upon issuance of a certificate of completion. No application for release of a performance bond, deposit, or other assurance will be considered before three years following issuance of a certificate of completion. The CO₂ shall not be subject to the right of any person other than the owner of the CO₂. Neither injection nor an order of the board shall affect ownership of the CO₂ or inhibit the voluntary conveyance of title to the CO₂ by the owner.	Miss. Code Ann. §53-11-25 and 27 Miss. Code Ann. §53-11-9.
Pore Space Ownership	Undetermined.	
Unitization	Generally, owners representing a majority of the surface interest, on the basis of and in proportion to the surface acreage content of the unit area, must consent in writing to a CCUS project before unitization. If oil or gas or both are expected to be produced in connection with operating a unit area as a geologic sequestration facility, the facility may be operated under the existing plan of unitization.	Miss. Code Ann. §53-11-11(3) Miss. Code Ann. §53-11-15(1)(d)
Class VI Primacy	Not granted. The EPA is the primary enforcement authority.	
EOR	If oil or gas, or both, are being produced as an enhanced recovery project operating under a board order, the board may make an order recognizing the incidental sequestration of CO₂ that is occurring during its enhanced oil or gas recovery project without requiring the project to qualify as a geologic sequestration facility. An operator of an enhanced oil or gas recovery project utilizing injection of CO₂ may request that the board approve such a project as a geologic sequestration facility but is not required to do so.	Miss. Code Ann. §53-11-15(2) Miss. Code Ann. §53-11-33.
Mineral Rights Primacy	An order by the board approving a geologic sequestration facility will not be issued unless the correlative rights of all owners of interest in the oil, gas or other commercial minerals are protected.	Miss. Code Ann. §53-11-13
Storage Fund	The Carbon Dioxide Storage Fund has been established in order to pay the costs for oversight of geologic storage facilities after cessation of injection at the facility. The facility operator must pay a per-ton fee to be applied to enforcement and administration costs of the board's activities. When the balance of the fund exceeds \$2.5 million per geologic sequestration facility, the board shall abate the per-ton fee.	Miss. Code Ann. §53-11-23
Notable legislation: S.B. 2723 (2011); H.B. 1214 (2022).		

MONTANA

One of the first states in the nation to develop a regulatory framework for carbon management, Montana introduced a climate plan in 2020 that identifies CCUS as an emissions reduction solution. Montana also has joined a number of regional partnerships aimed at promoting and furthering the deployment of carbon capture.

Issue	Description	Authority
Regulatory Authority	The Montana Board of Oil and Gas Conservation is vested with the power to regulate CO ₂ wells, including through permitting and rulemaking.	Mont. Code Ann. §82-11-111(5)
CO₂ Ownership and Liability	Until the certificate of project completion is issued and title to the stored CO₂ and geologic storage reservoir is transferred to the state, the geologic storage operator is liable for the operation and management of the CO₂ injection well, the geologic storage reservoir, and the injection or stored CO₂. The certificate of completion may not be issued until 25 years after CO₂ injections end. After issuing a certificate, the Board of Oil and Gas Conservation shall ensure adequate monitoring for a period of 25 more years. Title may be transferred to the state after the 25-year period of monitoring and verification. The operator may elect to accept indefinite liability and not transfer title.	Mont. Code Ann. §82-11-182 Mont. Code Ann. §82-11-183
Pore Space Ownership	Ownership of the pore space is presumed to be vested in the surface estate owner(s), unless deeds or severance documents indicate otherwise.	Mont. Code Ann. §82-11-180(3)
Unitization	Owners representing 60% of pore space capacity must consent to a CCUS project before unitization.	Mont. Code Ann. §82-11-204(b)
Class VI Primacy	Not granted. The EPA is the primary enforcement authority.	
Mineral Rights Primacy	For purposes of determining priority of subsurface uses between severed mineral estate and pore space, the mineral estate is dominant.	Mont. Code Ann. §82-11-180(2)(a)
Storage Fund	The operator shall pay into the Geologic Storage Reservoir Program Account a fee for each ton of CO₂ injected for storage. The fee is set by the board to approximate the actual amount required for monitoring and managing reservoirs post-closure. If an operator elects to indefinitely accept liability for a storage reservoir, it need not pay into the account.	Mont. Code Ann. §82-11-181
EOR	Wells where CO ₂ is injected for enhanced oil or gas recovery may be converted to CO ₂ injection wells.	Mont. Code Ann. §82-11-184
Notable legislation: S.B. 498 (2009).		

NEBRASKA

Nebraska is replete with ethanol and coal plants that provide opportunities for large-scale CCUS implementation. Centrally located, Nebraska is well positioned to serve as both a hub and a corridor for the transport of CO₂, connecting large emissions sources in the Northern United States to storage facilities as far south as the Permian Basin. To prepare the ground for CCUS development, the Nebraska Legislature passed comprehensive legislation in 2021.

Issue	Description	Authority
Regulatory Authority	The Nebraska Oil and Gas Conservation Commission has jurisdiction and authority to enforce laws relating to the geologic storage of CO ₂ and subsequent withdrawal of stored CO ₂ , according to the Nebraska Geologic Storage of Carbon Dioxide Act.	Neb. Rev. Stat. §57-1605
CO₂ Ownership and Liability	The storage operator has title to the CO₂ injected into and stored in a storage reservoir until the commission issues a certificate of project completion. While the storage operator holds title, the operator is liable for any damage the CO₂ may cause, including damage caused by CO₂ that escapes from the storage facility. Upon application, a certificate of project completion may be issued only after the commission has consulted with the Nebraska Department of Environment and Energy and the UIC program permitting authority, and after public notice and hearing.	Neb. Rev. Stat. §57-1618 Neb. Rev. Stat. §57-1619
Pore Space Ownership	Title to any reservoir estate underlying the surface of lands and waters is vested in the owner of the overlying surface estate unless it has been severed and separately conveyed. Conveyance of the surface ownership shall be a conveyance of the reservoir estate unless ownership interest in the reservoir estate has previously been severed from the surface ownership or is explicitly excluded in the conveyance.	Neb. Rev. Stat. §57-1604 (1-2, 5)
Unitization	Before unitization, 60% of pore space owners must consent to a CCUS project. The commission may require reservoir estates owned by nonconsenting owners to be included in a storage facility.	Neb. Rev. Stat. §57-1610 (13) Neb. Rev. Stat. §57-1612
Class VI Primacy	Not granted. The EPA is the primary enforcement authority.	
Mineral Rights Primacy	The severed mineral estate is dominant over the reservoir estate. Issuance of a permit shall not be construed to prevent a mineral owner or mineral lessee from drilling through or near a storage reservoir to explore for and develop minerals if the drilling, production, and related activities comply with commission requirements that preserve the storage facility's integrity and protect the objectives of the act.	Neb. Rev. Stat. §57-1604 (4) Neb. Rev. Stat. §57-1615 (12)
Storage Fund	Two funds have been established: the Carbon Dioxide Storage Facility Administrative Fund to defray administrative expenses (e.g., processing permit applications, regulating construction of facilities, etc.) and the Carbon Dioxide Storage Facility Trust Fund to defray expenses for long-term monitoring and management of a closed storage facility. For each fund, the storage operator must pay a fee for each ton of CO₂ injected for storage, to be set by the commission.	Neb. Rev. Stat. §57-1616-17
Notable legislation: L.B. 650 (2021).		

NORTH DAKOTA

With numerous large-scale coal power plants, gas-processing facilities and sources of ammonia production, North Dakota provides ample opportunity for the implementation of industrial-scale CCUS projects. Many of the state's industrial facilities are located along rail lines that provide potential right of way benefits for expansion of existing pipeline infrastructure. Additionally, North Dakota has the capacity to store more than 100 billion metric tons of CO₂ in secure geologic formations, including within the Basal Cambrian and Mission Canyon formations. For this reason, North Dakota was one of the first states to enact carbon sequestration legislation.

Issue	Description	Authority
Regulatory Authority	The North Dakota Industrial Commission is authorized to regulate geologic storage of CO ₂ and set forth certain permitting requirements, which are detailed in the Administrative Code.	N.D. Cent. Code §38-22-04-11 N.D. Admin. Code §43-05-01-01 et seq.
CO₂ Ownership and Liability	The storage operator has title to the CO ₂ injected into and stored in a storage reservoir and holds title until the commission issues a certificate of project completion. A certificate of completion may not be issued until at least 10 years after CO ₂ injections end.	N.D. Cent. Code §38-22-16-17 N.D. Cent. Code §38-22-17
Pore Space Ownership	Title to pore space underlying the surface is vested in the owner of the overlying surface estate. That ownership interest can be conveyed. Title to pore space cannot be severed from title to the surface estate.	N.D. Cent. Code §47-31-03-04 N.D. Cent. Code §47-31-05
Unitization	Before unitization, 60% of pore space owners must consent to a CCUS project.	N.D. Cent. Code §38-22-08(5)
Class VI Primacy	The EPA has approved North Dakota's application under the SDWA to implement a UIC program for Class VI injection wells.	EPA-HQ-OW-2013-0280; FRL-9976-92-OW
Mineral Rights Primacy	The dominance of the severed mineral estate over the pore space estate under the common law is expressly not altered by statute.	N.D. Cent. Code §47-31-08
Storage Fund	Two funds have been established for CCUS projects. The Carbon Dioxide Storage Facility Administrative Fund was created as a special fund for defraying commission expenses in processing permitting applications, regulating storage facilities, and making storage amount determinations. The Carbon Dioxide Storage Facility Trust Fund was created as a special fund for defraying expenses for long-term monitoring and managing of closed storage facilities. Storage operators pay into the fund a fee for each ton of CO ₂ injected.	N.D. Cent. Code §38-22-14-15
EOR	Enhanced oil or gas recovery projects may be converted to a storage facility project.	N.D. Cent. Code §38-22-19
Notable legislation: S.B. 2095 (2009).		

OKLAHOMA

Oklahoma is well positioned to incorporate both carbon capture and geologic storage throughout numerous industrial sectors. As one of the nation's historical leaders in EOR and home to numerous industrial facilities eligible for 45Q tax credits, Oklahoma is a fit for ongoing deployment of CCUS projects. In recognition of this opportunity, the Oklahoma Legislature passed comprehensive legislation establishing a regulatory framework for CCUS permitting and liability through the Oklahoma Carbon Capture and Geologic Sequestration Act.

Issue	Description	Authority
Regulatory Authority	The Oklahoma Corporation Commission has exclusive jurisdiction over CO ₂ sequestration facilities involving, and injection of CO ₂ for carbon sequestration into oil reservoirs, gas reservoirs, coal-bed methane reservoirs, and mineral brine reservoirs. The Department of Environmental Quality has exclusive jurisdiction over CO ₂ sequestration facilities involving injection of CO ₂ for carbon sequestration into all reservoirs other than those described above, which shall include, but not be limited to, deep saline formations, unmineable coal seams where methane is not produced, basalt reservoirs, salt domes, and non-mineral-bearing shales.	Okla. Stat. tit. §27A-3-5-103
CO₂ Ownership and Liability	Generally, CO ₂ injected into a CO ₂ sequestration facility is considered the personal property of the facility owner and not the property of the owner of the surface or mineral estate in the land encompassing the geographic boundary of the CO ₂ sequestration facility, or any person claiming under the owner of the surface or mineral estate.	Okla. Stat. tit. §27A-3-5-105
Pore Space Ownership	Until title to the pore space or rights, interests or estates in the pore space are separately transferred, pore space is property of the person or people holding title to the land surface above it.	Okla. Stat. tit. §60-6
Unitization	None. In the event the state of Oklahoma establishes a unitization process, the Corporation Commission shall regulate all aspects of such process.	Okla. Stat. tit. §27A-3-5-105
Class VI Primacy	Not granted. The EPA is the primary enforcement authority.	
EOR	Nothing in the Oklahoma Carbon Capture and Geologic Sequestration Act shall alter the rights of the owners of the mineral estate or adversely affect enhanced oil or gas recovery efforts in the state.	Okla. Stat. tit. §27A-3-5-106(a)
Mineral Rights Primacy	Rights granted under the Oklahoma Carbon Capture and Geologic Sequestration Act shall be without prejudice to the rights of any surface owner or mineral owner of the land encompassed within the defined geographic boundary of the CO ₂ sequestration facility to drill or bore through the approved reservoir in a manner as shall comply with orders, rules and regulations issued for the purpose of protecting the approved reservoir against the escape of CO ₂ .	Okla. Stat. tit. §27A-3-5-106(b)
Storage Fund	The Carbon Sequestration Assessment Cash Fund shall be used by the Oklahoma Conservation Commission to carry out the Oklahoma Carbon Sequestration Enhancement Act. The state treasurer shall credit to the fund any money appropriated to the fund by the Legislature and any money received as gifts, grants, or other contributions from public or private sources obtained for the purposes of the Oklahoma Carbon Sequestration Enhancement Act.	Okla. Stat. tit. §27A-3-4-104
Notable legislation: S.B. 610 (2009).		

TEXAS

Texas is home to the energy capital of America, hundreds of large industrial emissions sources ripe for carbon capture retrofitting, and easy access to numerous geologic formations capable of permanently storing large amounts of CO₂ safely. Moreover, Texas has the highest concentration of energy companies with institutional knowledge and experience relating to carbon capture, including with respect to projects that require capturing carbon, drilling injection wells and deploying carbon-capture technology at scale. To capitalize on the state's head start and geographic advantages, the Texas Legislature has passed comprehensive carbon capture legislation and taken several steps to obtain Class VI primacy from the EPA.

Issue	Description	Authority
Regulatory Authority	The Texas Railroad Commission has jurisdiction and authority to enforce laws relating to the injection and geologic storage of CO ₂ .	Tex. Admin. Code §5.201 et seq. Texas Water Code §27.047 Tex. Health & Safety Code §382.506
CO₂ Ownership and Liability (Onshore)	Unless otherwise provided by contract or other legally binding document, or by other law, CO ₂ stored in a geologic storage facility is considered the property of the storage operator. It is not considered the property of the owner of the surface or mineral estate.	Tex. Nat. Res. Code §121.002
Pore Space Ownership	Unclear due to conflicting case law.	
Class VI Primacy	Not granted. The EPA is the primary enforcement authority. The Texas Railroad Commission has been granted authority to seek Class VI primacy.	Tex. Water Code §27.048
Mineral Rights Primacy	A permit for injection and geologic storage may be issued only if it is shown that the injection and geologic storage of CO ₂ will not endanger any oil, gas or other mineral formation.	Tex. Water Code §27.051
Storage Fund	The Anthropogenic Carbon Dioxide Storage Trust Fund is a special fund created to cover long-term monitoring and remediation of CO ₂ injection and storage sites. The fund consists of application fees (\$50,000/application), an annual fee (\$50,000/year) and an injection fee (\$.025/ ton of CO ₂). The fund is statutorily capped at \$5 million.	Tex. Nat. Res. Code §121.003; Tex. Admin. Code §5.205
EOR	Requirements and regulations relating to injection of CO ₂ for the purpose of EOR are distinct from requirements and regulations relating to injection of CO ₂ for other purposes.	Tex. Admin. Code §5.301
Permits	An operator may transfer its geologic storage facility permit to another party if specific requirements are met.	Tex. Admin. Code §5.202(c)
Offshore	The commissioner of the General Land Office shall contract with the University of Texas Bureau of Economic Geology to identify potential locations for offshore CO₂ repositories. The School Land Board will make the final determination on suitable location, contract for creation of suitable infrastructure, issue fees, and set rules for monitoring and verification. The School Land Board will acquire title to CO₂ stored in CO₂ repositories on a determination by the board that permanent storage has been verified and that the storage location has met all applicable state and federal requirements for closure of CO₂ storage sites. On the day the Texas Permanent School Fund acquires the right, title and interest in CO₂, the producer of the CO₂ is relieved of liability.	Tex. Health & Safety Code §382.503-506 Tex. Health & Safety Code §382.507
Notable legislation: H.B. No. 1796 (2009); S.B. No. 1387 (2009); H.B. No. 1284 (2021).		

UTAH

Utah has numerous facilities that are well suited for the deployment of carbon capture technology, including coal power plants that collectively emit nearly 25 metric tons of carbon each year. Moreover, Utah has large active oil fields suitable for enhanced oil recovery operations and deep saline aquifers with storage potential. To further support CCUS projects, the state of Utah recently passed a bill that provides certainty to potential project stakeholders on issues such as permitting, liability and pore space ownership.

Issue	Description	Authority
Regulatory Authority	Subject to granting of primacy by the EPA, the Utah Board of Oil, Gas, and Mining, Division of Oil, Gas, and Mining, is granted exclusive jurisdiction over Class VI wells and regulation activities relating to storage facilities in the state.	Utah Code §40-11-3 Utah Code §40-11-5
CO2 Ownership and Liability	The storage operator has title to the CO2 injected into and stored in a storage reservoir and holds title until the board issues a certificate of project completion. The storage operator is liable for any damage the stored CO2 may cause, including damage caused by escaping stored CO2, until the board issues a certificate of completion. Upon issuance of a certificate of completion, title to the CO2 and storage facility, as well as any liability relating thereto, is transferred to the state. A certificate of completion may not be issued until at least 10 years after CO2 injections end.	Utah Code §40-11-15 Utah Code §40-11-16
Pore Space Ownership	Title to pore space underlying the surface estate is vested in the owner of the surface estate.	Utah code §40-6-20.5
Unitization	In the absence of a written agreement, the board may enter an amalgamation order combining all interests in a contiguous pore space for development of a storage facility. The order shall provide for payment to nonconsenting owners for their share of profits and reimbursement to consenting owners for the nonconsenting owners' share of costs of operation. An amalgamation order will only be effective after the plan for operating the storage facility is approved in writing by owners whose combined interest under the order is not less than 70% of the profits from operation.	Utah Code §40-11-10 Utah Code §40-11-11
Class VI Primacy	Not granted. The EPA is the primary enforcement authority.	Utah Code §40-11-2
Mineral Rights Primacy	Utah regulations shall not prevent a mineral owner or lessee from drilling through or near a storage reservoir to explore or develop mineral resources, provided that exploration and development preserves the integrity of the storage facility.	Utah Code §40-11-14
EOR	The board may make additional rules to allow for circumstances unique to the conversion of an enhanced oil and gas recovery project to a storage facility.	Utah Code §40-11-17
Storage Fund	The Geologic Carbon Storage Facility Administrative Fund is established to defray the division's regulatory expenses incurred during the regulation of storage facility construction, operation, and preclosure activities. The Geologic Carbon Storage Facility Trust Fund is established to defray the expenses the division incurs in the long-term monitoring and management of a closed storage facility. The board shall establish a fee consisting of a levied fee per ton of CO2 injected into a reservoir, and the fee is paid into the funds.	Utah Code §40-11-20 Utah Code §40-11-21
Notable legislation: H.B. 0244 (2022).		

WEST VIRGINIA

West Virginia is a focal point of the federal government's ongoing efforts to support development of the CCUS industry. The DOE's National Energy Technology Laboratory operates at three sites across the nation, one of which is located in Morgantown. West Virginia is a natural fit for innovation in CCUS as the state is home to one of the country's highest concentrations of CO₂-emitting coal plants.

Issue	Description	Authority
Regulatory Authority	The West Virginia Oil and Gas Commission and the secretary of the Department of Environmental Protection have the authority to establish rules relating to geologic storage of CO ₂ .	W. Va. Code §22-11B-7 W. Va. Code §22-11A-4
CO₂ Ownership and Liability	The storage operator shall be the owner of the CO ₂ injected into and stored in a storage reservoir and shall maintain ownership and control until the secretary of the commission issues a certificate of underground carbon dioxide storage project completion. While the storage operator has ownership, the operator is liable for any damage the CO ₂ may cause. The certificate of completion may not be issued until at least 10 years after CO ₂ injections end.	W. Va. Code §22-11B-11 W. Va. Code §22-11B-12 (c)
Pore Space Ownership	Title to pore space in all strata underlying the surface of lands and waters is vested in the owner of the overlying surface estate. Conveyance of title to the surface estate conveys the pore space. Title to pore space may not be severed from title to the surface of the real property. An instrument attempting to sever title to pore space from title to the surface is void and unenforceable.	W. Va. Code §22-11B-18 (a-b) W. Va. Code §22-11B-18 (c)
Unitization	A permit may not be issued to an operator unless the operator obtains consent of owners who own at least 75% of the storage reservoir's pore space and has begun the process of obtaining the remaining interests through the commission. If the storage operator does not obtain consent for construction and operation of an underground CO ₂ storage facility from all people who own the storage reservoir's pore space, the commission may require the pore space owned by nonconsenting owners be included in a storage facility.	W. Va. Code §22-11B-4 W. Va. Code §22-11B-19
Class VI Primacy	Not granted. The EPA is the primary enforcement authority.	
Mineral Rights Primacy	Issuance of a permit shall not affect the lawful right of a mineral owner to drill or bore through a CO ₂ storage facility if done in accordance with the secretary's underground injection control permit rules or any other applicable legal requirements intended to protect the CO ₂ storage facility against the escape of CO ₂ .	W. Va. Code §22-11B-9 W. Va. Code §22-11A-8
Storage Fund	The Carbon Dioxide Storage Facility Administration Fund is a special revenue fund established to pay all expenses associated with processing permit and certificate applications, regulating storage facilities, and making storage amount determinations. The Carbon Dioxide Storage Facility Trust Fund is a special revenue fund established to pay expenses associated with the long-term monitoring and management of closed storage facilities.	W. Va. Code §22-11B-13 W. Va. Code §22-11B-15
Notable legislation: H.B. 4491 (2022).		

WYOMING

Wyoming was one of the very first states to enact legislation relating to CCUS, and it has developed a comprehensive regulatory scheme that addresses issues such as pore space ownership, long-term liability, unitization, and primacy of mineral rights. Wyoming is home to both significant fossil energy production and extensive geologic reservoirs for sequestration. It also boasts substantial pipeline infrastructure to service carbon transportation needs.

Issue	Description	Authority
Regulatory Authority	The Wyoming Department of Environmental Quality is authorized to establish rules, regulations, and standards relating to permits for geologic sequestration of CO ₂ .	Wyo. Stat. Ann. §35-11-313*
CO2 Ownership and Liability	The injector of CO ₂ shall have title to any CO ₂ injected into and stored in the underground reservoir until a certificate of project completion is issued. All CO ₂ and other substances injected into any geologic sequestration site for the purposes of geologic sequestration shall be presumed to be owned by the injector. A certificate of project completion cannot issue until at least 20 years after CO ₂ injections end.	Wyo. Stat. Ann. §35-11-318* Wyo. Stat. Ann. §34-1-153(a) Wyo. Stat. Ann. §35-11-319*
Pore Space Ownership	Ownership of all pore space is vested in the surface estate owner(s). That ownership interest can be conveyed. No owner of pore space or other person holding any right to control pore space shall be liable for the effects of injecting CO ₂ for geologic sequestration purposes.	Wyo. Stat. Ann. §34-1-152 Wyo. Stat. Ann. §34-1-153(b)
Unitization	Before unitization, 80% of pore space owners must consent to a CCUS project. In specific circumstances and upon application, this amount can be reduced to 75%.	Wyo. Stat. Ann. §35-11-316*
Class VI Primacy	The EPA has approved Wyoming's application under the SDWA to implement a UIC program for Class VI injection wells. Applicants must comply with W.S. §35-11-313 and WQRR, Chapter 24.	EPA-HQ-OW-2020-0123 FRL- 10013-68-OW
Mineral Rights Primacy	For purposes of determining priority of subsurface uses between severed mineral estate and pore space, the mineral estate is dominant.	Wyo. Stat. Ann. §34-1-152
Storage Fund	The Wyoming Geologic Sequestration Special Revenue Account consists of monies collected to measure, monitor and verify Wyoming geologic sequestration sites. Fees submitted by permittees, which may include a per-ton injection fee or a closure fee, shall be deposited into the special revenue account.	Wyo. Stat. Ann. §35-11-320* Wyo. Stat. Ann. §35-11-313(f)(vi)*
EOR	The Oil & Gas Conservation Commission must certify geologic CO ₂ sequestration incidental to EOR operations.	Wyo. Stat. Ann. §30-5-502
Notable legislation: SF 47 (2022). *Effective July 1, 2023		

OTHER STATES

Although many states have not yet installed a comprehensive legislative framework for regulation of CCUS projects, there are myriad laws across the country relating to carbon capture or sequestration, including laws relating to exploratory commissions, pilot programs, primacy and carbon credit registries. Below is a mere sampling of such legislation from states not previously addressed herein.

State	Legislation	Description
Alabama	S.B. 36 (2022)	Expanding the types of gases that can be stored in underground caverns to include CO ₂ and designating the Alabama Oil and Gas Board as the state authority that will regulate gas storage activities.
Arizona	S.B. 1396 (2022)	Establishing a committee to study carbon capture and sequestration, including the long-term liability and responsibility for sequestered carbon and the regulation of underground sequestered carbon.
Colorado	H.B. 23-1210 (2023)	Requiring the Colorado energy office and the office of economic development to contract with an organization for the development of a "carbon management roadmap" for the state.
Georgia	S.B. 356 (2004) H.B. 355 (2021)	Establishing the Georgia Carbon Sequestration Registry, which allows participants to voluntarily record carbon sequestrations and facilitates the exchange of offsets.
Hawaii	H.B. 2182 (2018)	Establishing a permanent Greenhouse Gas Sequestration Task Force.
Illinois	S.B. 1704 (2007)	A project-specific bill in which Illinois assumed liability associated with carbon sequestered in its pilot project.
	H.B. 165 (2021)	Establishing the Carbon Capture Utilization and Storage Legislation Task Force to provide an assessment of Illinois subsurface storage resources and necessary elements of its regulatory program.
Oklahoma	S.B. 1856 (2022)	Requiring the office of the secretary of Energy and Environment to create and administer a grant program for entities utilizing sequestration of carbon captured from production of hydrogen from natural gas.
Ohio	H.B. 175 (2022)	Requiring the Ohio Department of Natural Resources to begin the process of seeking primacy over Class VI injection wells for carbon sequestration from the EPA.
Washington	S.B. 6001 (2007)	Directing the DOE and the Energy Facility Site Evaluation Council to set rules for geologic sequestration and specifying that geologic sequestration can be used to meet greenhouse gas emissions reduction goals. S.B. 6001 was the first substantive geologic sequestration legislation in the country.
	Wash. Admin. Code §173-407-010 through 173-407-080; 173-218-010 through 173-218-130	Establishing rules in accordance with S.B. 6001 relating to geologic sequestration, including with respect to an underground injection control program.
West Virginia	S.B. 162 (2023)	Authorizing the Director of the Division of Natural Resources to lease pore spaces underlying state forests, natural and scenic areas, wildlife management areas, and other lands under the jurisdiction and control of the Director for underground carbon sequestration.

Although not detailed in this handbook, many states have also passed legislation relating to tax incentives, subsidies and carbon transportation. For more information on state laws concerning CCUS, please reach out to the author.

Table 1. Overview of types of permits and permissions needed for CCUS projects

Portion of the CCUS effort	Authorization	Authorities that may require permits/permissions	Type of Agency**
Utilization, Capture, Transportation, Geologic Sequestration	Land use	Local government, federal government (public lands)	City council, federal land manager U.S. Forest Service, Bureau of Land Management, etc.
	Discharges to surface water	State and/or federal government	State Department of Environmental Quality, U.S. EPA
	Discharge of dredge or fill materials to waters of the U.S.	State and/or federal government	U.S. Army Corps of Engineers and/or relevant state office (Florida, Michigan and New Jersey)
	Endangered species	State and/or federal government	State environmental or natural resources department, U.S. Fish and Wildlife Service, National Oceanic and Atmospheric Administration Fisheries
	Greenhouse gas reporting	State and/or federal government	State Environmental Department, U.S. EPA
Utilization, Capture	Air permits	State and/or federal government	State Environmental Department, U.S. EPA
Transportation	CO2 pipeline safety	State and/or federal government	State and federal transportation departments
	Siting CO2 pipelines	Local, state and federal government	State transportation department or utility commissions; federal land management agencies
Geologic Sequestration	Pore space ownership and mineral rights	Local, state and federal government (if federal lands)	Determined by state-specific laws, federal agency managing federal lands to be used
	CO2 injection (and sequestration) permitting	State and/or federal government (some states have primacy for Class VI permitting)	State Environmental Department, U.S. EPA
**Federal responsibility is listed together with exemplary state and local governments (which vary depending on local context). For tribal lands/sovereign nations, the tribal government will have oversight.			

ABOUT THE AUTHOR

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Federal Permit or Review	Agency	Type of Project	Summary of Permitting/ Review and Responsibility	Authority
Clean Air Act Title V Operating Permit	The EPA for states, territories, or tribes that do not have EPA-approved programs or delegated authority	Utilization, capture	A Title V operating permit is required for any "major source" and certain other sources. A major source has actual or potential emissions at or above the major source threshold for certain air pollutants. In air quality attainment areas, the major source threshold is 100 tons/year, while lower thresholds may apply in nonattainment areas (for the pollutant that is in nonattainment). Major source thresholds for hazardous air pollutants are 10 tons/year for a single HAP or 25 tons/ year for any combination of HAP. Also, sources with a major source permit under the New Source Review permitting program are required to obtain a Title V permit. The Title V operating permit generally does not add new requirements for the facility; rather, it contains emission limitations and other conditions as necessary to assure compliance with all air quality control requirements or "applicable requirements" required under the Clean Air Act (e.g., New Source Performance Standards, National Emission Standards for Hazardous Air Pollutants, state implementation plans and NSR), and it requires that certain procedural requirements be followed.	42 U.S.C. §7661 et seq; 40 CFR Parts 70, 71
Prevention of Significant Deterioration / NSR	The EPA for states, territories, or tribes that do not have EPA-approved programs or delegated authority	Capture	PSD permits are required for new major stationary sources or major modifications for pollutants where the area the source is located is in attainment or unclassifiable with the National Ambient Air Quality Standards. Nonattainment NSR permits are required for new major stationary sources or major modifications in areas that do not meet one or more of the NAAQS. A minor NSR permit is required for any new or modified source of air pollutant that emits lower than the major NSR emissions thresholds and, thus, is not subject to PSD or NNSR permitting.	42 U.S.C. §§7470- 7479, 42 U.S.C. §§7501- 7503; 40 CFR Parts 49, 51 and 52
Underground Injection Control Program	The EPA for states, territories or tribes that do not have primary enforcement authority (often called primacy)	Geologic sequestration	Storage or disposal of water and fluids may be managed by injecting them underground using injection wells. Injection wells are regulated by the UIC program in order to protect underground sources of drinking water. Activities performed by the UIC program include maintaining well inventory, permitting injection wells, performing inspections and ensuring compliance with permit requirements. When operators manage wells in a way that does not meet the applicable UIC requirements, the program alerts operators to issues and may assist operators in returning the wells to compliance or take enforcement action. The UIC program classifies injection wells based on the type of fluids the well receives, the purpose of the injection and where the fluid is injected relative to underground sources of drinking water. Class II wells are used to inject fluids related to oil and gas production. Class VI wells are used to inject CO2 deep underground for long-term storage.	42 U.S.C. §300f et seq.; 40 CFR Parts 144-148
Resource Conservation and Recovery Act	The EPA for states, territories, or tribes that do not have delegated authority	Utilization, capture, transportation, geologic sequestration	The RCRA conditionally excludes CO2 streams from the definition of hazardous waste, provided these hazardous CO2 streams are captured from emissions sources, are transported in compliance with U.S. Department of Transportation requirements, are injected into UIC Class VI wells for purposes of geologic sequestration and are not mixed with, or otherwise co-injected with, any other hazardous waste. The RCRA conditional exemption exclusion does not apply to the disposition of CO2 other than injection into a Class VI injection well.	42 U.S.C. §6901 et seq.; 40 CFR Part 261.4(h)
National Pollutant Discharge Elimination System	The EPA for states, territories, or tribes that do not have delegated authority	Geologic sequestration	The Clean Water Act is the principal law governing pollution control and water quality of the nation's waterways. The CWA establishes conditions and permitting for discharges of pollutants into the waters of the United States under the NPDES, which was created in 1972 by the CWA. To the extent there are discharges of process wastewater or stormwater associated with CCS systems, these would be permitted by NPDES. The NPDES program has the authority to implement pollution control measures such as setting wastewater standards for industries and regulating point sources that discharge pollutants to surface waters.	33 U.S.C. §1251 et seq.
Clean Water Act Section 404/ Section 401	Department of Defense for states, territories, or tribes that do not have delegated authority; the EPA for states, territories, or tribes that do not have delegated authority	Utilization, capture, transportation	Discharge of dredge or fill materials to waters of the U.S. / federal water quality certifications	33 U.S.C. §1344/33; U.S.C. §1341
Hazardous Materials Transportation Act	Department of Transportation	Transportation	The Hazardous Materials Transportation Act protects against the risks to life, property and the environment that are inherent in the transportation of hazardous material in intrastate, interstate and foreign commerce.	49 U.S.C. 5101 et seq. and 49 CFR Parts 100-185

Federal Permit or Review	Agency	Type of Project	Summary of Permitting/ Review and Responsibility	Authority
Endangered Species Act	Department of the Interior (generally for terrestrial and freshwater species) and Department of Commerce (generally for marine species)	Transportation, geologic sequestration	ESA consultation must occur to prevent federal action that may jeopardize an endangered or threatened species or result in destruction or adverse modification to critical habitat. If a federal action "may affect" listed species, the action agency must pursue consultation with either the U.S. Fish and Wildlife Service or NOAA Fisheries, depending on the species involved.	16 U.S.C. §1531 et seq.; 50 CFR Part 17
Fish and Wildlife Conservation Act/Fish and Wildlife Coordination Act	Department of the Interior	Utilization, capture, transportation, geologic sequestration	The Fish and Wildlife Conservation Act, 16 USC §2901 et seq., encourages federal agencies to conserve and promote conservation of nongame fish and wildlife species and their habitats. In addition, the Fish and Wildlife Coordination Act, 16 USC §661 et seq., requires Federal agencies undertaking projects affecting water resources to consult with the Fish and Wildlife Service and the appropriate state wildlife agency.	16 U.S.C. § 2901-2912; 50 CFR Part 83; 16 U.S.C. § 661-667d
Rights of Way for Pipelines Through Federal Lands	Department of the Interior	Transportation	Rights of way through any federal lands may be granted by the secretary of the Interior Department or the appropriate agency head for pipeline purposes for the transportation of oil, natural gas, synthetic liquid or gaseous fuels, or any refined product produced therefrom.	30 U.S.C. 185; 43 CFR Part 2880
Federal Land Policy and Management Act – Federal Lands	Department of the Interior	Transportation, geologic sequestration	The FLPMA directs the BLM to adopt resource management plans to provide for multiple use and sustained yields on public lands. The FLPMA also directs the BLM to prevent unnecessary or undue degradation of the land.	43 U.S.C. §§1701- 1785
National Forest Management Act – Federal Lands	Department of Agriculture	Transportation, geologic sequestration	The National Forest Management Act directs the U.S. Forest Service to adopt land and resource management plans to provide for multiple use and sustained yields within national forests.	16 U.S.C. §1600 et seq.
Mineral Leasing Act – Federal Lands	Department of the Interior	Transportation, geologic sequestration	Leases for federal minerals.	30 U.S.C. §181 et seq.; 30 U.S.C. §351-359; 43 CFR Part 2800
National Environmental Policy Act	Council on Environmental Quality	Utilization, capture, transportation, geologic sequestration	Establishes requirements for environmental reviews of federal actions, including requirements for preparation of EA and EIS for major federal actions.	42 U.S.C. §4321 et seq.; 40 CFR Parts 1500-1508
National Historic Preservation Act	Advisory Council on Historic Preservation	Utilization, capture, transportation, geologic sequestration	The National Historic Preservation Act requires federal agencies to evaluate the impact of federal actions on sites listed on, or eligible for, the National Register of Historic Places. Federal agencies must consult with state historic preservation offices, tribal historic preservation offices, American Indian and Alaskan Native tribes, and Native Hawaiian organizations before taking action that may affect resources of concern to them.	54 U.S.C. § 300101 et seq.; 36 CFR Part 800.3 et seq.
Outer Continental Shelf Lands Act – Offshore	Department of the Interior	Transportation, geologic sequestration	Under OCSLA, DOI may permit the use of CO2 for enhanced oil recovery activities on existing oil and gas leases on the Outer Continental Shelf.	43 U.S.C. §1334
Marine Protection, Research and Sanctuaries Act – Offshore	EPA	Transportation, geologic sequestration	Under the MPRSA, the EPA issues permits for the transportation and ocean disposal of materials other than dredged material. The EPA may issue a permit if the disposition of material will not unreasonably degrade or endanger human health, welfare or amenities or the marine environment, ecological systems or economic potentialities. The statutory language is defined broadly to include "any disposition" of material but does not include the placement of a device in ocean waters or on or in the submerged land beneath such waters, for a purpose other than disposal, when such construction or such placement is otherwise regulated by federal or state law or occurs pursuant to an authorized Federal or State program. No MPRSA permit may be issued for industrial waste, which means any solid, semisolid or liquid waste generated by a manufacturing or processing plant. The industrial waste prohibition was enacted by Congress in 1982, prior to the widespread understanding of carbon capture technologies to reduce carbon streams to a plasma state with some properties of a liquid and some properties of a gas. CO2 streams prepared for storage are not solid, semisolid or liquid wastes.	16 U.S.C. §1431 et seq.; 33 U.S.C. §1401 et seq.