Liability Protection for Carbon Dioxide Sequestration in Texas

TEXANS FOR LAWSUIT REFORM FOUNDATION

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INTRODUCTION

Currently, fossil fuels, which include coal, natural gas, and petroleum, provide nearly 80 percent of the energy supply in the United States.[1] Nuclear electric power accounts for nine percent, and renewable energy (geothermal, solar, hydroelectric, wind, biomass waste, biofuels, and wood) makes up only 12 percent.[2]

When fossil fuels are burned, they release carbon dioxide (CO_2) into the atmosphere. CO_2—along with water vapor, methane, and nitrous oxide—is a "greenhouse gas," in that its existence in the atmosphere keeps the Earth warmer than it would be without it.[3] CO_2 is emitted through numerous sources, including fossil-fueled power plants, mobile or small generators serving remote pumping and compression stations for pipeline and industrial mineral mining activities, cement manufacturing, ammonia production, iron and non-ferrous metal smelters, industrial boilers, refineries, petrochemical manufacturers, natural gas wells, and residential water heaters and stove tops, to name a few. In 2021, worldwide energy-related CO_2 emissions were 36.3 billion tons.[4]

According to a 2022 special report by the United Nations' Intergovernmental Panel on Climate Change, conservative estimates show that the world will need to capture over one billion tons of CO_2 per year to prevent the planet's average temperature from rising more than 2.7 degrees Fahrenheit above its pre-industrial level.[5] The median estimate provides that six billion tons should be removed per year.[6] Considering carbon capture plants in operation or under construction in North America only have the capacity to capture 40 million tons of CO_2 per year,[7] the UN's proposition is a target that will be difficult to reach.

While cutting emissions is considered by many to be the most important and immediate mechanism for reducing CO_2 in the atmosphere, another useful approach for mitigating potential climate change due to anthropogenic emissions of CO_2 is to capture CO_2 from fossil-fuel-using sources and either use it or store it in geologic or oceanic reservoirs.[8] This process is known as carbon capture, utilization, and sequestration (CCUS).

Many states in the U.S. already have operational CCUS technology and facilities and, accordingly, statutes and regulations governing their use and operations. These regulatory schemes are intended to encourage development of climate-friendly technology, while also safeguarding the viability of the energy industry. Recently, states have enacted plans that transfer title, responsibility, management, and liability to the state after a certain amount of time following the closure of a CO_2 sequestration reservoir.

Enacting similar legislation and other liability-controlling measures in Texas would promote development of CCUS projects that will benefit both the economy and the environment. Texas, in particular, is positioned to become a world leader in CCUS due to the state's vast geologic storage capacity, both onshore and offshore, and the expertise already existing in the state from the oil and gas industry. Investment in CCUS projects in Texas will create jobs, reduce emissions, and ensure the viability of the energy industry.

This paper first explores and defines relevant terms as a helpful guide to the reader, then discusses and compares the CCUS statutes enacted in other states. Next, the paper describes CCUS in Texas, including how to secure the right to sequester CO_2 in Texas, existing CCUS laws, current participants in CCUS, possible legal issues, liability protection statutes related to other industries and events, and proposed liability protections that could be adopted in Texas to encourage development of CO_2 sequestration projects.

EXPLANATORY TERMS AND TOPICS

CCUS touches science, technology, business, politics, and the economy. The following is a short primer on a few relevant topics.

Carbon Dioxide

Carbon dioxide, a greenhouse gas, is a chemical compound (CO_2). When released through burning fossil fuels, it is known as anthropogenic CO_2.[9] There is also a natural CO_2 cycle, arising from decomposing vegetation, venting volcanoes, and outgassing from oceans and animals.[10] CO_2 is colorless, odorless, nonflammable, and nontoxic in normal amounts.[11]

Per Texas law, CO_2 is considered both a commodity and a pollutant. When sold for enhanced oil recovery (EOR), defined below, it is treated as a commodity.[12] However, pursuant to the Texas Clean Air Act, CO_2 is classified as a pollutant under the definitions for "air contaminant," "air pollution," and "greenhouse gas emissions."[13]

Carbon Capture, Utilization, and Sequestration

Carbon capture is the separation and entrapment of CO_2. Carbon utilization is the term to describe the ways that captured carbon, principally CO_2, can be used or "recycled" to produce economically valuable products or services.[14] Carbon sequestration is the injection of CO_2 into geologic or oceanic reservoirs for timescales of centuries or longer. CCUS is essential to lowering greenhouse gas emissions because the CO_2 would otherwise be emitted to, or remain in, the atmosphere.

There are two types of carbon sequestration. The first focuses on CO_2 capture and storage, where CO_2 is captured at its source, such as an electric power plant, or withdrawn from the air and stored in non-atmospheric reservoirs, such as depleted oil and gas reservoirs, un-minable coal seams, deep saline formations mineralized into basalt formations, and the deep ocean.[15] The second focuses on enhancing natural processes to increase the removal of carbon from the atmosphere, such as forestation.[16] For purposes of this paper, only the first method of carbon sequestration will be discussed.

CCUS comprises three broad steps:

1. capturing and separating CO_2 from other gases;
2. compressing and transporting the captured CO_2 to the storage site, usually via pipeline; and
3. using the CO_2 or injecting it in a subsurface geological reservoir.[17]

Capturing CO_2. The most challenging phase, both technologically and financially, is the first step. CO_2 is difficult to capture, especially in large quantities, because it is very dispersed—comprising only 414 parts per million, or 0.04 percent, of the atmosphere.[18] Of course, while this percentage is small, it amounts to trillions of tons of CO_2 in the Earth's atmosphere. The equipment necessary to capture CO_2 is capital-intensive to build and energy-intensive to operate.[19] The higher the CO_2 concentration among a volume of air—for example, in a point-source emitter's flue stack—the lower the implied cost on a per-ton equivalent basis to capture such CO_2.

While there are several ways[20] to capture CO_2, two particularly relevant methods are: (1) direct air capture, which essentially vacuums CO_2 from the air; and (2) pre-release capture, which prevents CO_2 from ever entering the atmosphere. In the latter method, CO_2 is captured at the point the carbon fuel is used—either after combustion (in the exhaust stack) or before combustion (when fuels are gasified, separating CO_2 from hydrogen or other fuels or feedstocks). However it is captured, the CO_2 is pumped underground into geologic formations where it mineralizes and remains trapped indefinitely.

Transporting CO_2. There are five common transport methods: pipeline, truck, railway, ship, and barge. In Texas, pipelines are favored over other methods because they are the best option for transporting large volumes of CO_2.[21] This is so because transporting CO_2 through pipelines is efficient and "pose[s] no higher risk than is already safely managed for transporting hydrocarbons such as natural gas and oil."[22]

While transport via truck and rail are less expensive than via pipelines (lesser costs of construction, operation, maintenance, access and right-of-way, regulatory burdens, etc.), the costs can end up being greater if the distance is long or there are large volumes of CO_2.[23] Because transporting CO_2 by truck and rail is only possible for relatively small quantities, they are not optimal transportation methods for long-term CCUS projects.

Texas boasts the largest pipeline infrastructure in the U.S. with more than 479,000 miles of pipelines,[24] over 2,000 miles of which transport CO_2.[25] For years, some of these pipelines have been used to transport CO_2 in EOR operations, mostly in western Texas.[26] And the "[t]ransport of CO_2 by pipeline is mature in the Gulf Coast region."[27] As of 2015, the Permian Basin CO_2 pipelines—located mostly in Texas, but crossing into New Mexico and Colorado—have over 2,600 miles; and the Gulf Coast CO_2 pipelines, located in Texas, Louisiana, and Mississippi, have 740 miles.[28] In years to come, existing pipelines may be retrofitted into CO_2 pipelines.[29]

Utilizing CO_2. Currently, the predominate use of captured CO_2 is for EOR, which Texas has been doing for years. As discussed below, EOR is the process used in the petroleum industry by which CO_2 is injected into oil and gas reservoirs to push the oil and gas to increase the flow of the remaining substance, thus enabling greater production.[30] While most captured CO_2 currently ends up being sequestered or used for EOR, CO_2 has the potential to create other products, including building materials and carbon fiber materials.[31] However, at this time, a relatively small amount of captured CO_2 is used for these purposes because potential products are in the early stages of technological development.[32]

Sequestering CO_2. Lastly, CO_2 is injected, either onshore or offshore, into a subsurface geological formation, such as a deep saline aquifer, a depleted oil and gas reservoir, an un-minable coal bed, basalt formations, or the deep ocean floor, where it will be trapped for hundreds or thousands of years.[33]

Enhanced Oil Recovery

An oil well operator will never retrieve 100 percent of the oil in a reservoir. To maximize recovery of the oil remaining in the reservoir after normal production, CO_2 is pumped into depleted reservoirs to either push oil to the production point or mix with and decrease the viscosity of the oil to increase flow to boost production. This process is known as EOR.

Approximately 99 percent of the CO_2 used for EOR remains sequestered in the subsurface reservoir formation from which the oil was produced.[34] Most of the CO_2 utilized for EOR in the U.S. comes from naturally occurring CO_2 deposits, instead of being captured from industrial sources.[35]

The U.S. is a world leader in EOR, injecting roughly 68 million tons of CO_2 underground per year to help recover oil and gas.[36] While EOR can be conducted either onshore or offshore, most U.S. CCUS projects associated with EOR are onshore, with the vast majority of operations in western Texas.[37]

CCUS is just now becoming a mainstream topic, even though the first commercial-scale CO_2 capture effort was launched in West Texas in 1972 and was used for EOR.[38] This same technology is used in oil and gas fields across the U.S. to make exploration more effective, prolong the life of existing projects, and limit CO_2 emissions.

Environmental Protection Agency

The Environmental Protection Agency (EPA) regulates the construction, operation, permitting, and closure of injection wells. These wells are used to store fluid underground into a porous geologic formation.[39] The formations range from deep sandstone or limestone to a shallow soil layer, as well as below water tables and aquifers from which, in certain areas, fresh water may be produced for industrial, agricultural, or municipal uses.[40] The fluids injected may include water, waste water, brine, or water mixed with chemicals. The definition of a well is a "bored, drilled, or driven shaft whose depth is greater than the largest surface dimension; or, a dug hole whose depth is greater than the largest surface dimension; or, an improved sinkhole; or, a subsurface fluid distribution system."[41]

There are six classes of wells, each based on the specific type and depth of the injection activity and the potential the activity has to result in the endangerment of underground sources of drinking water (USDW).

1. *Class I: Industrial and Municipal Waste Disposal Wells*. Class I wells are used to inject hazardous and non-hazardous wastes into deep, isolated rock formations.
2. *Class II: Oil and Gas Related Injection Wells.* Class II wells are used exclusively to inject fluids associated with oil and natural gas production, i.e., EOR.
3. *Class III: Injection Wells for Solution Mining.* Class III wells are used to inject fluids to dissolve and extract minerals.
4. *Class IV: Shallow Hazardous and Radioactive Injection Wells.* Class IV wells are shallow wells used to inject hazardous or radioactive wastes into or above a geologic formation that contains USDW.
5. *Class V: Wells for Injection of Non-hazardous Fluids Into or Above USDW.* Class V wells are used to inject non-hazardous fluids underground. Most Class V wells are used to dispose of wastes into or above USDW.
6. *Class VI: Wells Used for Geologic Sequestration of CO_2.* Class VI wells are wells used for injection of CO_2 into underground subsurface rock formations for long-term storage, or geologic sequestration.[42]

The construction of an injection well depends on the type of fluid and depth the fluid is to be injected.[43] Wells that inject CO_2 into deep isolated formations have a complex and sophisticated construction, designed to provide multiple layers of protective casing and cement.[44] Mechanical pumping and compressing equipment is utilized to manage transport, injection, and reservoir pressures throughout the journey from capture equipment to permanent storage.

Section 1421 of the Safe Drinking Water Act (SDWA) requires the EPA to develop Underground Injection Control (UIC) program requirements that protect underground sources of drinking water from endangerment.[45] The EPA has developed UIC program requirements that are designed to be adopted by states, territories, and tribes.[46] States may apply for primary enforcement responsibility to implement the UIC program, which is called primacy.

In general, state and tribal programs must meet or exceed minimum federal UIC requirements to gain primacy. If a state or tribe does not obtain primacy, the EPA implements the program directly through one of its regional offices.

Currently, North Dakota and Wyoming are the only states with primacy for all six well classes.[47] These two states do not go through the EPA to obtain permits for injection wells constructed in the state. However, if the states fail to enforce the EPA's environmental standards, primacy can be revoked. Texas has primacy for Classes I–V wells and, as a result of legislation passed in 2021, is presently in the process of applying for primacy for Class VI wells.[48] Consequently, at least for the time being, CO_2 injection wells constructed in Texas for CCUS must be permitted by the EPA.

Regardless of a state's primacy status, however, owners or operators of permitted Class VI wells must still submit geologic sequestration project information directly to the EPA.[49] The mandatory reporting information includes, among other requirements: results of periodic tests of mechanical integrity; monthly volume and mass of CO_2 stream injected; changes to physical, chemical, and other characteristics of a CO_2 stream; and notices to close a sequestration site.[50] However, while the EPA must be notified of a well closure, it does not have authority over a state with primacy to authorize a closure.[51]

Jurisdictional Considerations

In 1980, the Interstate Commerce Commission (ICC), predecessor to the Surface Transportation Board (STB), maintained that it lacked jurisdiction over CO_2 pipelines because the Interstate Commerce Act was not applicable to pipelines carrying "gas," which the ICC interpreted to include CO_2.[52] To date, the STB has not reversed the ICC's ruling.

The Federal Energy Regulatory Commission (FERC) approves pipeline siting and regulates transportation rates of interstate natural gas pipelines.[53] In 1979, FERC ruled that because CO_2 contains only trace amounts of methane, it cannot be defined as a "natural gas" pursuant to the Natural Gas Act (NGA).[54] Because a CO_2 pipeline operator is not a "natural gas company" under the NGA, FERC concluded that it lacks jurisdiction over CO_2 pipelines.[55]

Thus, while front-end permitting and construction are governed by federal environmental laws and regulations, interstate CO_2 pipelines are not economically regulated at the federal level due to FERC and STB both declining to assume that responsibility. Therefore, once constructed and permitted, CCUS operations are primarily regulated by the states.

CCUS ACROSS THE UNITED STATES

Although CCUS is a nascent technology, the energy industry has become more interested in it, leading some state legislatures to respond, with the objective of encouraging CCUS. Indiana, Louisiana, Montana, Nebraska, North Dakota, and Wyoming have created frameworks regulating CCUS and provided a process by which the states may assume liability and responsibility for plugged CO_2 sequestration sites. Most of these states have rigorous "certificate of project completion" requirements prior to assuming liability. The requirements typically include: compliance with all applicable state and federal laws, stability of the stored CO_2, and a showing that the injection well has been plugged, the wells and related equipment are in good condition and will retain mechanical integrity, and the required reclamation work has been completed. The states have also outlined the relevant CO_2 trust fund accounts and how they are funded and spent, and some states have enacted relevant nuisance laws.

Indiana

Indiana General Assembly House Bill 1209, which went into effect July 1, 2022, provides that upon the issuance of a certificate of completion of a CO_2 storage project, the state will assume ownership of and responsibility for the facility.[56] The state also assumes responsibility for future regulatory compliance and liability associated with the facility.[57] To be issued a certificate of completion, the storage operator must:

1. be in compliance with all applicable laws governing the storage facility;
2. show that the storage facility is reasonably expected to retain the CO2 stored therein;
3. show that the CO_2 in the storage facility is stable by demonstrating that either the stored CO_2 is essentially stationary or, if the stored CO_2 migrates, migration will be unlikely to cross the boundaries of the storage facility;
4. show that all wells, equipment, and facilities used after the closure period are in good condition and retain mechanical integrity;
5. show that injection wells have been plugged;
6. show that equipment and facilities, not including fixed structures and long-term monitoring equipment and wells, have been removed;
7. prove that the required reclamation work where the project ceases to inject CO_2 is completed;
8. have provided a notice of intent for site closure to the EPA, and the EPA must have authorized closure; and
9. have provided to the EPA the site closure report or a comparable report to the state regulatory body if the state assumes primacy for UIC Class VI permitting.[58]

The storage operator is required to pay the Indiana Department of Environmental Management a fee of eight cents per ton of sequestered CO_2, which funds the state's CO_2

storage facility trust fund.[59] The fund is used for the long-term monitoring and management of Indiana CCUS projects.[60]

In regard to liability for the operation of the facility before it is completed and turned over to the state, the new law has two provisions. First, it allows a public utility to recover damages for impact on a source of public water supply from a CCUS project in Indiana.[61] Second, it provides that claims of subsurface trespass are unenforceable against a storage operator, unless the claimant shows the injection or migration of CO_2: "(1) is injurious to health, indecent, offensive to the senses, or an obstruction to the free use of property so as essentially to interfere with the comfortable enjoyment of life or property; or (2) has caused direct physical injury to a person, an animal, or tangible property."[62]

In such a trespass lawsuit, damages recoverable from the storage operator are limited to "the loss of a nonspeculative value resulting from the injection and migration of carbon dioxide beyond the storage facility."[63] The law allows a surface or subsurface property owner to seek punitive damages if the storage operator violates the requirements of the UIC Class VI well permit or acts with reckless disregard of public safety.[64]

Louisiana

In Louisiana, ten years after CO_2 storage operations cease at a storage facility, a certificate of completion of injection operations is issued and the state takes title to the sequestered CO_2.[65] To be issued a certificate of completion, the storage operator merely has to show "that the reservoir is reasonably expected to retain mechanical integrity and the carbon dioxide will reasonably remain emplaced."[66] After the certificate is issued, the storage operator, all generators of any injected CO_2, and all owners of the CO_2 stored and having interest in the storage facility are released from liability, with two caveats: (1) the last owner or operator of a storage facility remains liable if Louisiana's Carbon Dioxide Geologic Storage Trust Fund is depleted of funds such that it cannot remediate liability that may arise after a certificate of completion is issued; and (2) release of liability does not extend to intentional and knowing concealment or misrepresentation of material facts related to the mechanical integrity of the sequestered CO_2.[67]

As to the owner or operator of a CO_2 storage facility (before and after ownership is transferred to the state), CO_2 transmission pipeline, or generator of CO_2 handled by either the facility or pipeline, noneconomic compensatory damages are capped at $250,000 in a civil action, regardless of the trust fund amount.[68] If, however, the action is for wrongful death, physical deformity, loss of use of a limb or bodily organ system, or permanent physical or mental functional injury, the maximum amount recoverable as compensatory damages for noneconomic loss is $500,000 per occurrence.[69]

The trust fund comprises money from:

1. fees, penalties, and bond forfeitures collected pursuant to Louisiana environmental quality laws;
2. private contributions;
3. interest earned on money deposited in the fund;

4. civil penalties for violation of any rules or permit conditions imposed under Louisiana environmental quality laws;
5. costs recovered from responsible parties for geologic storage facility closure or remediation;
6. grants, donations, and sums allocated from a public or private source; and
7. site-specific trust accounts, but these monies cannot be used for any storage facility other than the one specified for the account.[70]

The trust fund may be used for:

1. operational and long-term inspecting, testing, and monitoring of the site, including remaining surface facilities and wells;
2. remediation of mechanical problems associated with remaining wells and surface infrastructure;
3. repairing mechanical leaks at the site;
4. plugging and abandoning remaining wells or conversion for use as observation wells;
5. administration of Louisiana environmental quality laws;
6. payment of fees and costs associated with the administration of the fund or site-specific accounts; and
7. payment of fees and costs associated with the acquisition of insurance for future storage facility liability.[71]

Montana

Montana's law regarding transfer of liability of completed CCUS projects was enacted in 2009.[72] The statute provides that a certificate of project completion may not be issued until at least 25 years after CO_2 injections cease.[73] After issuance of a certificate of completion, the board will monitor the reservoir for a period of 25 years,[74] and the storage operator will continue to provide bond or other surety and retains liability for the storage reservoir and stored CO_2 during that time.[75] A certificate of completion will be issued by the Board of Oil and Gas Conservation only if the geologic storage operator:

1. is in full compliance with regulations governing the geologic storage reservoir;
2. shows that the geologic storage reservoir will retain the CO_2 stored in it;
3. shows that all wells, equipment, and facilities to be used in the post-closure period are in good condition and retain mechanical integrity;
4. shows that it has plugged wells, removed equipment and facilities, and completed reclamation work as required by the board;
5. shows that the CO_2 in the geologic storage reservoir has become stable, which means that it is essentially stationary or chemically combined or, if

it is migrating or may migrate, that any migration will not cross the geologic storage reservoir boundary; and

6. shows that the geologic storage operator will continue to provide adequate bond or other surety for at least 25 years after receiving the certificate of completion, and that the operator continues to accept liability for the geologic storage reservoir and the stored CO_2.[76]

These requirements closely follow Wyoming's statute, except that storage operators in Montana remain liable for problems with both the storage reservoir and sequestered CO_2 for 50 years following the cessation of injections at a given sequestration site. However, the board, in conference with the relevant state and federal governmental entities, may adopt rules that allow the period to be less than 50 years, provided the time period is at least 30 years prior to transferring liability to the state.[77]

If liability is transferred to the state:

1. title is transferred, without payment or any compensation, to the state;
2. title acquired by the state includes all rights and interests in, and all responsibilities associated with, the geologic storage reservoir and the stored CO_2;
3. the geologic storage operator and all persons who generated any injected CO_2 are released from all regulatory requirements and liability associated with the geologic storage reservoir and the stored CO_2;
4. any bonds or other surety posted by the geologic storage operator must be released; and
5. monitoring and managing the geologic storage reservoir and the stored CO_2 is the state's responsibility to be overseen by the board until the federal government assumes responsibility for the long-term monitoring and management of geologic storage reservoirs and stored CO_2.[78]

Nebraska

Enacted in 2021, the Nebraska Geologic Storage of Carbon Dioxide Act created a regulatory framework for CCUS projects.[79] The law was enacted because "it is in the public interest to promote the geologic storage of carbon dioxide . . . [and] [d]oing so will benefit the state and the global environment by reducing greenhouse gas emissions and will help ensure the viability of the state's energy and power industries."[80] The state also recognizes CCUS as a potentially valuable commodity to be used for commercial and industrial purposes and that the "[u]se of any subsurface stratum and any materials and fluids contained therein for geologic storage of carbon dioxide is a reasonable and beneficial use."[81]

The statute provides that the Nebraska Oil and Gas Conservation Commission has a duty to ensure that a CCUS facility does not cause pollution or create a nuisance, substances that compromise CCUS operations do not enter a storage reservoir, and CO_2 does not escape from a storage facility.[82] Nebraska law provides that "carbon dioxide streams stored, and which remain in storage under a commission permit, are not a pollutant and do not constitute a nuisance."[83]

The commission requires two fees, remitted to the Carbon Dioxide Storage Facility Administrative Fund, which is paid by storage operators on each ton of CO_2 injected for sequestration: one for administrative costs and the other for expenses of long-term monitoring and management of CCUS facilities in the state.[84] The fee amounts, set by the commission, are based on the commission's anticipated expenses in regulating storage facilities during their construction, operational, and pre-closure phases, and on the anticipated expenses associated with long-term monitoring and management of the storage facility following issuance of the certificate of project completion.[85]

A storage operator in Nebraska holds title to and remains liable for CO_2 injected into and stored in a geologic storage reservoir until the commission issues a certificate of project completion.[86] To obtain a certificate, there must be public notice and hearing and conference with the Department of Environment and Energy and the applicable UIC program permitting authority (i.e., the EPA, unless the state obtains primacy over Class VI wells).[87] A certificate will only be issued if the storage operator:

1. is in full compliance with all laws governing the storage facility;
2. shows that it has addressed all pending claims regarding the storage facility's operation;
3. shows that it has received an authorization of site closure from the applicable UIC program permitting authority for each storage facility injection well; and
4. shows that any wells, equipment, and facilities to be used in the post-closure period are in good condition and retain mechanical integrity.[88]

Once a certificate is issued, the state assumes liability of and title to the storage facility and the stored CO_2, without payment of any compensation, and the storage operator and generators are released from liability and regulatory requirements.[89] Thereafter, the state is responsible for monitoring and managing the storage facility, to be overseen by the commission.[90] The attorney general may file suit on behalf of the commission to enforce the act.[91]

Nebraska's CCUS laws closely resemble those of North Dakota.

North Dakota

North Dakota is one of two states with primacy over Classes I–VI UIC wells.[92] The state's Industrial Commission (NDIC) and Pipeline Authority have regulatory responsibility for CO_2 (and EOR) and CCUS, and the North Dakota Public Service Commission regulates CO_2 pipelines.[93]

According to North Dakota statutes, CO_2 "is a potentially valuable commodity, and increasing its availability is important for commercial, industrial, or other uses, including [EOR], gas, and other minerals."[94] And, "[i]t is in the public interest to promote the use of carbon dioxide to benefit the state, to help ensure the viability of the state's coal and power industries, and to benefit the state economy."[95]

In North Dakota, sequestered CO_2 that remains in storage under a commission permit "is not a pollutant nor does it constitute a nuisance," but the commission is responsible for ensuring CO_2 does not escape a storage facility nor that other substances compromise the integrity of a storage reservoir.[96]

Similar to Nebraska, storage operators pay two separate fees, set by the commission, to the NDIC for each ton of injected CO_2.[97] The first fee funds NDIC permitting and administrative activities, and the second pays for long-term monitoring and management of a closed storage facility.[98]

Unlike Nebraska, North Dakota specifies that a certificate of project completion may not be issued until at least ten years after CO_2 injections cease.[99] At that point, and after public notice and hearing and conference with the department of environmental quality, the NDIC may issue a certificate if the storage operator:

1. is in full compliance with all laws governing the storage facility;
2. shows that it has addressed all pending claims regarding the storage facility's operation;
3. shows that the storage reservoir is reasonably expected to retain the CO_2 stored in it;
4. shows that the CO_2 in the storage reservoir has become stable;
5. shows that all wells, equipment, and facilities to be used in the post-closure period are in good condition and retain mechanical integrity; and
6. shows that it has plugged wells, removed equipment and facilities, and completed reclamation work as required by the commission.[100]

For purposes of the fourth element, stored CO_2 "is stable if it is essentially stationary or, if it is migrating or may migrate, that any migration will be unlikely to cross the storage reservoir boundary."[101] Once a certificate of completion is issued, title, responsibility, and liability is transferred to the state, "until such time as the federal government assumes responsibility for the long-term monitoring and management of storage facilities."[102]

Wyoming

The other state with primacy over Classes I–VI UIC wells is Wyoming.[103] Wyoming classifies CO_2 as both a commodity and a pollutant. CO_2 is classified as a commodity—a gas and an associated natural resource—for purposes of the Office of State Lands and Investments and the Wyoming Pipeline and Infrastructure Authority,[104] and as an air pollutant and greenhouse gas for purposes of the Wyoming Department of Environmental Quality air quality regulatory program.[105]

In 2022, the Wyoming legislature passed Senate File 47,[106] establishing a process for the state to assume title of and liability for captured and sequestered CO_2 after a 20-year monitoring period following issuance of a certificate of project completion.[107] The state also is transferred title to the facility used to inject or store the CO_2, and the state will manage and monitor the stored CO_2 until the federal government assumes long-term responsibility.[108] After the state assumes title, the injector is forever released from all regulatory requirements associated with the continued storage and maintenance of the stored CO_2, including monetary liability for damages after the title is transferred.[109]

In order for a CCUS project to receive a certificate of project completion, several conditions must be satisfied, in addition to a public notice of application, an opportunity for public comment, and a public hearing on the application for a certificate of project completion. The certificate of project completion will not be issued until the injector with title to the CO_2 establishes to the satisfaction of the department that:

1. the injector is in full compliance with all laws governing the injection and storage of the CO_2;
2. the injector has addressed any pending claims regarding the injection and storage of the CO_2;
3. the underground place or pore space where the CO_2 was injected or stored is expected to no longer expand vertically or horizontally and poses no threat to human health, human safety, the environment, or USDW;
4. the stored or injected CO_2 is unlikely to cross any underground or pore space boundary and is not expected to endanger any USDW or otherwise endanger human health, human safety, or the environment;
5. all wells, equipment, and facilities to be used in maintaining and managing the stored CO_2 are in good condition and will retain mechanical integrity; and
6. the injector has plugged any injection wells and completed all reclamation required by the department.[110]

Once the state has assumed ownership and liability for the CCUS site, monetary damages arising from problems with the site are limited to the available funds in the Wyoming Geologic Sequestration Special Revenue Account,[111] which is funded by money collected by the department to:

1. test, monitor, and inspect sequestration sites following the project completion certification;
2. remediate mechanical problems associated with remaining wells and infrastructure;
3. plug and abandon monitoring wells; and
4. pay future claims associated with the release of CO_2 from the geologic sequestration sites following project completion certification, release of all financial assurance instruments, and termination of the permit.[112]

It is unclear whether the liability cap applies only to the state, with excess liability being paid by the storage operator or, instead, whether all damages for the state and all prior operators and contributors are limited to the amount in the account.

CCUS IN TEXAS

Texas is an ideal candidate for developing CCUS. Texas produces more CO_2 from industrial activities than any other state, accounting for about 25 percent of energy-related CO_2

emissions in the U.S. industrial sector and almost 13 percent of all CO_2 emissions from the U.S. power generation sector.[113] It also has a vast amount of onshore and offshore geologic storage potential, produces a tremendous amount of oil and gas, has a breadth of engineering and subsurface expertise and talent, and has a business-friendly environment. However, policymakers will need to remove hurdles to help Texas leverage its position to assume a leadership role in the global effort to capture and store CO_2.

Existing CCUS Laws in Texas

2003: FutureGen Project. Texas's first involvement in CCUS legislation was largely precipitated by the state's efforts to secure the $1.5 billion federally funded FutureGen project.[114] The project was announced by President George W. Bush in 2003 and was a public–private partnership to construct a coal-fueled, near-zero emissions powerplant that would incorporate the capture and permanent sequestration of CO_2.[115] In 2006, the Texas Legislature passed House Bill 149, relating to the ownership and use of CO_2 captured by a "clean coal project"—i.e., FutureGen.[116] The bill authorized the Texas Railroad Commission, acting on behalf of the state, to acquire title to CO_2 captured by FutureGen.[117] While the FutureGen project was awarded to Illinois, it was unsuccessful and never launched. Federal funding was withdrawn in 2015.

Since then, the bill, codified at Texas Natural Resources Code sections 119.001 through 119.007, remains unused. However, those provisions may be useful in future CCUS legislation. For example, section 119.0025 provides that the Bureau of Economic Geology at The University of Texas at Austin is responsible for long-term monitoring of sequestered CO_2 of which the Railroad Commission has acquired title. And sections 119.002 and 119.004 have helpful language for transferring liability to the state.

2009: CCUS Permitting and Regulations. In 2009, the Legislature passed Senate Bill 1387, relating to the implementation of projects involving the capture, injection, sequestration, or geologic storage of CO_2.[118] The bill amended the Water Code and Natural Resources Code to establish the regulatory framework for CCUS projects in Texas.[119] The bill also sets out provisions relating to authority granted to the Texas Railroad Commission to adopt rules authorizing multiple or alternative uses of injection wells, including the conversion of a well from its authorized purpose to a new or additional purpose (i.e., CO_2 injection), and provisions relating to the ownership of anthropogenic CO_2.[120] Senate Bill 1387, however, does not provide for the transfer of ownership of completed CCUS projects to the state after a period of time.

Senate Bill 1387 also prohibits a person from drilling or operating an anthropogenic CO_2 injection well for geologic storage or constructing or operating a regulated geologic storage facility without a permit issued by the Railroad Commission, and sets forth provisions for the permitting process and imposition of fees.[121] The bill requires the applicant for a permit to provide to the Railroad Commission a letter from the executive director of the Texas Commission on Environmental Quality (TCEQ) stating that drilling and operating the injection well will not injure any freshwater strata in that area and that the formation or stratum to be used for the geologic storage facility is not freshwater sand. It also requires other environmental protections to be met before the Railroad Commission issues a permit.[122] The bill requires the applicant to provide to the Railroad Commission satisfactory evidence of financial responsibility each year and sets forth provisions relating to a performance bond or other form of financial security an applicant may be required to maintain.[123]

2009: Offshore Geologic Storage of CO_2. Also passed in 2009 was the Texas Clean Air Act (House Bill 1796), discussed in more detail below, which has a provision similar to other states' assumption-of-liability laws for completed CCUS projects. The statute provides that following closure of an offshore geologic sequestration site, the Texas School Land Board shall acquire title to the injected CO_2, after which time the CO_2 producer (but not the operator) of the CCUS project is relieved of liability.[124]

2021: UIC Primacy in Texas. In 2021, the Legislature passed House Bill 1284, relating to the regulation of the injection and geologic storage of CO_2.[125] Notably, the bill granted the Railroad Commission sole jurisdiction over Class VI injection wells and CCUS in Texas.[126] The Railroad Commission now has the same regulatory authority over these Class VI wells as it has over oil and gas wells. Prior to the passing of this bill, TCEQ had split jurisdiction with the Railroad Commission over geologic storage of CO_2, depending on whether the geological formation itself was able to produce oil, gas, or geothermal resources. This framework was an impediment to Texas's ultimate goal of receiving primacy over Class VI wells from the EPA.

More specifically, House Bill 1284 amended the Injection Well Act, Water Code, Texas Clean Air Act, and Health and Safety Code to expand the Railroad Commission's jurisdiction over the geological storage and associated injection of anthropogenic CO_2 to include jurisdiction over any onshore and offshore injection and geologic storage of CO_2 in Texas.[127] The bill also amended the Natural Resources Code to authorize the use of the anthropogenic CO_2 storage trust fund by the Railroad Commission for the permitting of geologic storage facilities and associated anthropogenic CO_2 injection wells.[128]

Currently, Texas has primacy for UIC Classes I–V wells. The Legislature has removed a hurdle that affects streamlining the process of obtaining an injection well permit by tasking a single agency with seeking delegation authority from the EPA on Class VI injection wells. The Railroad Commission is currently preparing documents to apply for primacy over Class VI wells, having "submitted the primacy pre-application to EPA and expect to submit the full primacy application to EPA by October 2022."[129] Once Texas obtains primacy, the state can more efficiently embrace CCUS opportunities.

Participants in Texas's CCUS Projects

Because Texas is an ideal candidate for CCUS, there are several players in the state already engaging in these activities.

Petra Nova. The first U.S. fossil-fueled power plant generating electricity and capturing CO_2 in large quantities (over one million tons per year) was the Petra Nova project in southwest Houston.[130] The project ran from December 2016 until May 2020, during which time the facility captured roughly 92 percent of CO_2 from the slipstream of flue gas processed.[131] Petra Nova's goal was to reduce greenhouse gas emissions as part of the U.S. Clean Coal Power Initiative by installing post-combustion CCUS technology and increasing oil production to pay for it.[132] The project's operations were suspended in May 2020, a decision apparently made due to the state of oil markets at the time.[133] The facility is now placed in reserve shutdown status and purportedly will be brought back online when economic conditions improve.[134]

Talos Energy. In 2021, the Texas General Land Office (GLO) awarded a "first of its kind" CCUS project for offshore CO_2 storage in submerged lands near Jefferson County.[135] The GLO signed a lease agreement with Talos Energy, a Houston offshore oil producer, for 40,000 acres of state-owned submerged lands under the Gulf of Mexico, which is capable of storing 275 million metric tons of CO_2.[136] The project is "the first ever major offshore carbon sequestration site" in the U.S., according to Talos.[137] Talos's project is in conjunction with Carbonvert, Inc., a Colorado-based CCUS developer. The Talos–Carbonvert project will "help meet market-driven decarbonization goals while raising money for the Permanent School Fund."[138] As of the end of 2021, the project's bid will enter a phase to determine the leasing terms to be approved by the Texas School Land Board.[139] It appears this project meets the requirements for the Texas Clean Air Act, a statute which provides, in part, that after closure of an offshore geologic sequestration site, the Texas School Land Board shall acquire title to the injected CO_2, after which time the CO_2 producer is relieved of liability.[140]

Talos is also partnering with Howard Energy Partners and the Port of Corpus Christi Authority on a CCUS project at the southern port of Texas.[141] That project, named the Coastal Bend Carbon Management Partnership, is capable of sequestering up to 1.5 million tons of CO_2 per year into saline aquifers that have a capacity of up to 100 million metric tons.[142]

Occidental Petroleum. Occidental Petroleum is developing its first direct-air CO_2 capture facility in the Permian Basin, which will be capable of removing up to one million tons of CO_2 per year from the atmosphere.[143] Construction of the facility is expected to begin in the third quarter of 2022 and will be jointly engineered by Carbon Engineering.[144] The plant will use huge fans to draw in air and churn out pure CO_2, which will then be permanently sequestered.[145]

Houston CCS. Fourteen companies—Air Liquide, BASF, Calpine, Chevron, Dow, ExxonMobil, INEOS, Linde, LyondellBasell, Marathon Petroleum, NRG Energy, Phillips 66, Shell, and Valero—have collectively agreed to begin discussing plans for a CCUS project capable of storing up to 50 million metric tons of CO_2 per year by 2030 and about 100 million metric tons by 2040.[146] The idea is to use CCUS technology at existing facilities that generate electricity and manufacture products that are used every day, like plastics, motor fuels, and packaging.[147]

ExxonMobil. ExxonMobil recently announced it is planning a hydrogen production plant and one of the world's largest CCUS projects at its integrated refining and petrochemical site in Baytown, Texas.[148] The plan is to use natural gas to produce "blue hydrogen,"[149] and to capture and sequester the CO_2 produced from turning the gas into hydrogen.[150] The CCUS infrastructure for the project is expected to have the capacity to transport and store up to 10 million metric tons of CO_2 per year, more than doubling the company's current capacity.[151] ExxonMobil has 30 years of experience capturing and sequestering CO_2 and has captured more anthropogenic CO_2 than any other company, with "an equity share of about one-fifth of the world's carbon capture and storage capacity."[152]

POTENTIAL RISKS OF AND LIABILITY FOR CCUS OPERATIONS

For companies currently engaged in CCUS operations in Texas and future investors in CCUS projects, liability related to operating CCUS facilities is a great concern. On the back end of a project, a significant apprehension is the post-closure release or migration of sequestered CO_2 due to facility containment failure, miscalculating the reservoir's capacity, or damages from induced seismic activity,[153] which could result in harm to human health, drinking water, the environment, and property. On the front end and during operations, there is potential trespass, conversion, and nuisance liability, along with the risk of causing injury to persons or property as a result of operations to capture, transport, inject, and store CO_2. Indeed, the risks related to geologic storage of CO_2 are highest during the operational phase of a project and decrease over time through post-closure.[154] Of course, some of the risks associated with the capture, transport, and injection of CO_2 have been managed for decades in the context of EOR and similar activities.[155]

Generally, the liability exposures for entities engaged in CCUS operations can be allocated into four categories: (1) civil liability to the state, which may seek to enjoin or force remediation of widespread environmental damage; (2) civil liability to a person for causing injury to him or her; (3) civil liability for interfering with another person's use and enjoyment of their property; and (4) susceptibility to government agency enforcement actions. The acts or events that might give rise to liability that would fall into one or more of these categories include the following events (identified by the EPA) arising from the injection and sequestration of CO_2:

- contamination of shallower groundwater formations, including drinking water sources, through vertical migration of CO_2 in the subsurface;
- movement of salty water (brine) into drinking water sources caused by injection pressure;
- gradual leaks into the air from the injection well components or monitoring wells;
- sudden large accidental releases that could raise CO_2 concentration above safe levels for humans;
- elevated CO_2 concentrations in soils that could affect plant and animals;
- elevated CO_2 concentrations in the subsurface that could affect microbial populations;
- effects on minerals in the geologic formation; and
- earthquakes induced by injection pressure.[156]

The EPA's list is narrow and, naturally, focuses on the environmental ramifications of CCUS mishaps. The list is underinclusive in omitting potential liability for unanticipated migration of CO_2 within a reservoir, inviting subsurface trespass claims. The EPA's list also does not specifically mention that sequestered CO_2 may be mixed with other, harmful substances that escaped CO_2 might carry with it. Both of these topics are discussed below. And, of course, there are common forms of potential liability exposure for those engaged in the CCUS industry, including liability for such things as worksite injuries and vehicular collisions.

The specific causes of action that may be asserted include:

- a public nuisance action pursued by the state or a local governmental entity against a private CCUS operator to enjoin or abate a widespread environmental event, such as the release of captured CO_2;
- a public nuisance action pursued by the state or a local governmental entity against a private CCUS operator to enjoin or abate CCUS operations on purely policy grounds, such as an allegation that sequestering CO_2 encourages use of fossil fuels, which changes the climate;
- a nuisance action pursued by an individual against a private CCUS operator for an injury unique to him or her that is related to a widespread environmental event;
- an agency-level enforcement action or a civil action by one of multiple state and federal agencies having jurisdiction, seeking remedies related to an environmental event;
- a civil action by a local governmental entity under Texas Water Code section 7.351, seeking to penalize a CCUS operator for an environmental event;
- an inverse condemnation claim by property owners against the state after it obtains ownership of a closed CO_2 sequestration site, alleging escaped CO_2 has contaminated and rendered useless his or her property (such as drinking water), or made his or her property inaccessible (such as blocking access to oil and gas found in deeper formations);
- a subsurface trespass claim by a property owner, alleging CO_2 migrated into a subsurface structure that the CCUS operator had not obtained the right to occupy;
- a conversion claim in which a property owner asserts that escaped CO_2 has contaminated and rendered useless his or her property (such as drinking water), or made his or her property inaccessible (such as blocking access to oil and gas found in deeper formations);
- claims for negligence and gross negligence related to escaped CO_2 that allegedly caused personal injury, such as from CO_2 releases beyond safe levels for human exposure; and
- claims for negligence and gross negligence related to such things as worksite injuries and vehicular collisions during CCUS operations.

Subsurface Trespass and Conversion

In Texas, anthropogenic CO_2 (that is not injected for EOR) is considered the property of the storage operator, not the property of the surface or mineral estate owner where the CO_2 is stored.[157] Whether the surface and mineral estates are severed or not, potential liability for subsurface trespass or conversion may arise for a CCUS storage operator.

Ownership rights to a single underground reservoir where CO_2 might be stored often belong to several different owners. When injected CO_2 in one location migrates through the subsurface to another location where the pore space rights have not been obtained, this migration may constitute a trespass for which there may be liability. Once CO_2 is injected into a subsurface formation, the presence of the CO_2 can preclude "competing" uses of the pore space, such as oil and gas extraction, natural gas storage, and waste disposal.[158] Consequently, there may be damages for subsurface trespassing or conversion through the injection of CO_2 into pore space.

Subsurface trespass laws remain unsettled in Texas. In *Lightning Oil Co. v. Anadarko E&P Onshore, LLC,* the Texas Supreme Court weighed the established policy of encouraging maximum recovery of minerals while minimizing waste against the small potentially recoverable damages, but rejected Lightning's claim for trespass of the mineral estate when Anadarko drilled a well through the estate.[159] In that case, the Court stated that "although we agree that the surface owner owns and controls the mass of earth undergirding the surface, those rights do not necessarily mean it is entitled to make physical intrusions into formations where minerals are located and remove some of the minerals—as is probable if a well is drilled into or through such formations."[160] Yet the Court also held in *Humble Oil and Refining Co. v. West* that "the surface owner ha[s] the right to inject and store non-native gas in the formation before all of the native gas was produced."[161] Ultimately in *Lightning Oil,* the Court held that:

> the rights conveyed by a mineral lease generally encompass the rights to explore, obtain, produce, and possess the minerals subject to the lease; they do not include the right to possess the specific place or space where the minerals are located. Thus, an unauthorized interference with the place where the minerals are located constitutes a trespass as to the mineral estate only if the interference infringes on the mineral lessee's ability to exercise its rights.[162]

In another tort action against a well operator, *FPL Farming Ltd. v. Environmental Processing Systems, L.C.,* the Court discussed the difficulty for a landowner to prove actual injury from deep subsurface wastewater migration.[163] While this case related to the contamination of a water supply from wastewater migration and not CO_2 migration, how courts will resolve trespass claims in relation to CO_2 sequestration is unresolved.

Property and Natural Resource Damage

CO_2 itself is not federally regulated as a hazardous or toxic substance.[164] However, the "CO_2 stream," i.e., the full stream of liquid injected for geologic sequestration, is typically not pure CO_2.[165] "Depending on its source, CO_2 streams may contain substances that could be harmful to humans or the environment and subject to applicable regulations."[166] Thus, while CO_2 sequestration sites are evaluated and selected based on their ability to safely and securely store injected CO_2 and the other substances that accompany it, leakage of this impure CO_2 from storage reservoirs is a primary risk factor and possible impediment to widespread approval of geologic CO_2 sequestration.

It must also be noted that, in contrast with natural gas and oil leaks, CO_2 leaks are difficult to detect. Natural gas is lighter than air, so it dissipates quickly into the atmosphere, and when methane is used for industrial or residential purposes it may have a rotten-egg smell, which comes from an odorant added to aid in leak detection.[167] With an oil leak, the liquid pools, which is obvious on the ground and leaves an oily sheen on the surface of water.[168]

Oil also has a natural smell.[169] CO_2, on the other hand, does not have any odorant added to it and is naturally odorless.[170] Further, if leaked into the atmosphere, CO_2 transported in a liquid state through a pipeline will transform into a gas, due to the change of pressure and temperature, and dissipate.[171] These characteristics make CO_2 leaks challenging to detect.

Leaks of CO_2 are likely to be either: "a sudden, fast, and short-lived release of CO_2, as seen in the case of a well failure during injection or a sudden blowout" or "a slower, more gradual leak, occurring along undetected faults, fractures, or well linings."[172] Fortunately, CO_2 leaks from wells are declining due to improved operation and construction.[173]

Furthermore, CO_2 exists naturally in the atmosphere and is harmless to humans and wildlife, except possibly in large doses, and except to the extent CO_2 in the atmosphere is contributing to climate changes. In fact, "[a] minor but very important component of the atmosphere, [CO_2] is released through natural processes such as respiration and volcano eruptions."[174] And, of course, plants through photosynthesis convert water, sunlight, and CO_2 gathered from the atmosphere to create oxygen and energy in the form of glucose, which the plants use as food.[175] Consequently, the release of pure CO_2 into the atmosphere is not likely to cause injury to persons, other animals, plants, or property, except possibly in unusual circumstances. But, again, captured CO_2 is often accompanied by other, potentially more harmful, substances that could be released along with the CO_2.

After CO_2 has been injected into an underground reservoir, there is a possibility it may leak into nearby drinking water sources rather than escape into the air. The Safe Drinking Water Act essentially defines a "contaminant" as anything that is not a water molecule,[176] which includes CO_2. "Release of CO_2 or brine into [an underground source of drinking water] could be accompanied by measurable alteration in pH, major ions, and mobilization of hazardous inorganics."[177] Many studies have been done to evaluate the impacts of leaks on the quality of freshwater.[178] The results are contradictory. Some indicate CO_2 leaks pose a serious risk, some indicate low levels of risk, and others found possible benefits.[179] In sum, the scientific community has yet to reach an agreement of whether the impacts from the leakage of CO_2 into groundwater are negative, insignificant, or positive.[180]

Leaks, however, are not the only potential concern with geologically sequestering CO_2. Induced seismicity, i.e., earthquakes, can occur when the injection of CO_2 into a geologic formation changes the effective stress field of the pore space, causing energy stored in the rock mass to release and trigger a seismic event.[181] "If felt, seismicity has a negative effect on public perception and may jeopardize wellbore stability and damage infrastructure."[182] However, "[g]eologic carbon storage projects, both at large scale and pilot scale, have not induced any felt earthquake to date."[183] Microseismicity, which is seismic activity of such low magnitude that it is not felt on the ground surface, does occur.[184] Induced seismicity can be minimized, provided the CCUS operator performs proper site characterization, monitoring, and pressure management.

EXISTING LIABILITY PROTECTION STATUTES IN TEXAS

Texas has enacted a number of liability-limiting statutes that could serve as models for encouraging CCUS development in Texas. Some of the statutes create a heightened standard for recovery of damages, some cap damages that are recoverable, and some entirely negate particular claims or causes of action. Generally speaking, the reasoning behind these statutes is to encourage job creation or the development or sustaining of an economically or societally beneficial industry. A few of these statutes are described in the following sections.

Offshore Geologic Storage of CO_2

As noted above, the Texas Clean Air Act contains a provision similar to other states' assumption-of-liability laws. The statute provides that following closure of an offshore geologic sequestration site, the Texas School Land Board acquires title to the injected CO_2, after which time the CO_2 producer is relieved of liability.[185] The relevant provisions of the Health and Safety Code, subsection K, Offshore Geologic Storage of Carbon Dioxide, state:

> Sec. 382.507. OWNERSHIP OF CARBON DIOXIDE. (a) The board shall acquire title to carbon dioxide stored in the carbon dioxide repository 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 carbon dioxide storage sites.
>
> (b) The right, title, and interest in carbon dioxide acquired under this section are the property of the permanent school fund and shall be administered and controlled by the board.
>
> Sec. 382.508. LIABILITY. (a) The transfer of title to the state under Section 382.507 does not relieve a producer of carbon dioxide of liability for any act or omission regarding the generation of stored carbon dioxide performed before the carbon dioxide was stored.
>
> (b) On the date the permanent school fund, under Section 382.507, acquires the right, title, and interest in carbon dioxide, the producer of the carbon dioxide is relieved of liability for any act or omission regarding the carbon dioxide in the carbon dioxide repository.
>
> (c) This section does not relieve a person who contracts with the board under Section 382.504(b) [Contract for Necessary Infrastructure and Operation] of liability for any act or omission regarding the construction or operation, as applicable, of the carbon dioxide repository.[186]

Note that: (1) the storage operator retains responsibility for the sites it operates, even after the state assumes ownership, but the producer is relieved of liability; and (2) there is no time requirement prior to the state assuming liability.

The School Land Board makes the final decision about a suitable location for a sequestration site after receiving the land commissioner's recommendations.[187] Once operational, the School Land Board has authority to set the fees for the storage of CO_2, and the Bureau of Economic Geology at The University of Texas at Austin measures, reviews, and monitors the sequestered CO_2, acting as scientific advisor.[188]

Because this statute does not give the operator of a site any liability protection, it is fair to assume that this statute plays only a small role in encouraging the sequestration of CO_2.

Liability Related to Nuclear and Radioactive Materials

The Texas Radiation Control Act regulates the use of radiation in Texas and is designed to prevent unnecessary radiation exposure to the public.[189] The statute permits the development and use of radiation consistent with public health and safety and environmental protection.[190] It allows the Radiation Control Program to:

- develop rules and guidelines that allow for the safe use of radiation;
- evaluate safety procedures and issue licenses for use, handling, and possession of radioactive materials;
- register all devices and equipment that produce radiation;
- prepare emergency and environmental surveillance plans and conduct emergency response activities for fixed nuclear facilities in Texas;
- evaluate the financial qualifications of certain licensees to ensure the applicant is financially qualified to conduct the operations and decontamination, decommissioning, reclamation, and disposal that may become necessary; and
- inspect all entities licensed and registered to use radiation.[191]

In deciding to grant a license to process or dispose of low-level radioactive waste, TCEQ considers various criteria, including site suitability, socioeconomic effects, the applicant's financial and technical qualifications, security and emergency plans, and cleanup plans, among many other items.[192] TCEQ also requires a written analysis regarding the effect on the environment of the proposed storage.[193]

The applicant for a waste disposal facility must acquire title to and any interest in land and buildings for the facility.[194] If the applicant cannot secure a mineral right that is required of the applicant, TCEQ "may allow the applicant, to the extent permissible under federal law, to enter into a surface use agreement that restricts mineral access, including slant drilling and subsurface mining, to the extent necessary to prevent intrusion into the disposal facility site."[195] If a surface use agreement with a private landowner cannot be reached, the attorney general may institute eminent domain proceedings to acquire fee simple interest in the mineral right.[196]

The Act allows the state to assume liability for low-level radioactive waste if a number of conditions are met.[197] The compact waste disposal facility license holder must:

1. arrange for and pay the costs of management, control, stabilization, and disposal of compact waste and the decommissioning of the licensed activity;
2. convey to the state when the license is issued all required right, title, and interest in land and buildings acquired under [TCEQ rules], together with requisite rights of access to that property; and
3. formally acknowledge before termination of the license the conveyance to the state of the right, title, and interest in compact waste located on the property conveyed.[198]

The waste conveyed is the property of TCEQ on the state's behalf.[199] TCEQ may acquire the fee simple title in land, affected mineral rights, and buildings at which low-level radioactive waste is disposed.[200]

Importantly, the transfer of title to low-level radioactive waste and related land and buildings "does not relieve a license holder of liability for any act or omission performed before the transfer or while the low-level radioactive waste or land and buildings are in the possession and control of the license holder."[201] TCEQ must also monitor, maintain, and undertake emergency measures "necessary to protect the public health and safety and the environment in connection with low-level radioactive waste and property for which it has assumed custody."[202]

At least to some extent, this statute should encourage development of low-level radioactive waste because the site developer can eventually turn the site and waste over to the state, thus ending its ongoing liability exposure.

Liability Related to Space Flight Activities

In 2013, the Legislature passed House Bill 1791, relating to the facilitation and operation of space flight activities in Texas.[203] The law eliminates liability of a space flight entity "for damages resulting from nuisance arising from testing, launching, reentering, or landing" a spacecraft, launch vehicle, or reentry vehicle, except liability for breach of contract for use of real property by the space flight entity.[204] The statute also eliminates a space flight entity's liability for injury or damages caused to a space flight participant arising out of the entity's space flight activities if the participant signed the consent form provided in the statute.[205] Additionally, the statute prohibits injunctive relief with respect to space flight activities.[206]

Another bill that removed a major hurdle in regard to the development of a space-flight industry in Texas was 2013's House Bill 2623, which enabled certain counties and the GLO to temporarily close a beach or beach access point for the launching of rockets and conducting other space flight activities from the site.[207]

Texas's reasoning for enacting these bills was to facilitate growth of the private-sector commercial space-exploration industry in the state. After NASA's space shuttle program ended in 2011, the agency began seeking strategic partnerships with private spaceflight companies already operating in Texas, such as Elon Musk's SpaceX, to enable the commercialization of technology, support space exploration programs, and build stronger ties across the industry.[208]

Liability for Activities on Private Land

As most of Texas land is privately owned, the Legislature has enacted statutes giving liability protection to landowners to encourage them to allow recreation to take place on their private land and combat premises liability suits—the Texas Recreational Use Statute, Texas Agritourism Act, and Texas Farm Animal Liability Act.

The Recreational Use Statute provides that a landowner is not liable, except for intentional acts or gross negligence, if an injured person was using the land for a recreational purpose and the landowner either charged no fee, did not charge more than a certain amount, or carried a sufficient level of insurance. In other words, the statute results in the standard of duty owed to a trespasser, rather than the standard of care applicable to an invitee, being applied to recreational guests.[209] Originally, when the statute was passed in 1965, it applied only to hunting, fishing, and camping on private property.[210] Today, the term "recreation" includes: hunting, fishing, swimming, boating, camping, picnicking, hiking, pleasure driving, bird-watching, cave exploration, waterskiing, bicycling, disc golf, walking a dog, flying a drone, and rock climbing.[211]

The Texas Agritourism Act protects landowners from liability for injuries that occur during activities on agricultural land for recreational or educational purposes, regardless of compensation, if the landowner either hung a required sign or obtained a signed release incorporating specified language.[212]

The Texas Farm Animal Liability Act offers liability protection for a farm animal owner if an injury occurs to a farm animal activity participant and is a result of an inherent risk of that activity.[213] When it originally passed in 1995 as the "Texas Equine Activity Limitation of Liability Act," only equine animals were included. The 2011 Legislature amended the statute to include all farm animals.[214] The act was amended again in 2021 to expand liability protection to include farm animal activities, livestock shows, working ranches, and honeybee keepers.

Healthcare Liability

In order to increase access to medical care in Texas, the Legislature enacted healthcare liability reforms in 2003. Among the significant aspects of these reforms are caps on noneconomic damages and the requirement for an expert report to commence a lawsuit against a healthcare provider.[215]

In a healthcare liability lawsuit, the maximum amount a plaintiff may be awarded for noneconomic damages is $750,000—a maximum of $250,000 from each doctor or medical center and $500,000 collectively from all relevant medical facilities.[216]

The healthcare liability statute also provides that a plaintiff, early in a lawsuit, must serve on a defendant one or more expert reports providing a fair summary of the expert's opinions regarding the applicable standards of care, the manner in which the defendant's services failed to meet the standards of care, and the causal relationship between the failure to meet the standards of care and the plaintiff's injury.[217] If the report is not timely filed, the lawsuit must be dismissed.[218]

For emergency medical care provided in a hospital emergency department and healthcare provided in a hospital's obstetrical unit, the healthcare liability statute creates a heightened standard for recovery in a lawsuit. A healthcare provider may be held liable "only if the claimant shows by a preponderance of the evidence that the physician or health care provider, with willful and wanton negligence, deviated from the degree of care and skill that is reasonably expected of an ordinarily prudent physician or health care provider in the same or similar circumstances."[219]

Texas's healthcare liability statutes also contain a Good Samaritan provision, using a similar heightened standard for imposing liability: "A person who [without expectation of remuneration] in good faith administers emergency care is not liable in civil damages for an act performed during the emergency unless the act is wilfully or wantonly negligent."[220]

Another healthcare statute related to health information exchanges also relies on a heightened standard for recovery. "Unless the health care provider acts with malice or gross negligence, a health care provider who provides patient information to a health information exchange is not liable for any damages, penalties, or other relief related to the obtainment, use, or disclosure of that information in violation of federal or state privacy laws."[221]

Licensed or Registered Professional Liability

The same 2003 legislation as the above healthcare liability reforms[222] also provides that in a lawsuit for damages alleging professional negligence by a design professional (an architect or engineer), the plaintiff must file with the original petition an affidavit of a third party registered architect or licensed professional engineer competent to testify and practicing in the same area of practice as the defendant, which must set forth specifically at least one negligent act, error, or omission claimed to exist and the factual basis for each such claim.[223] The defendant is not required to answer the lawsuit if the affidavit is not filed and the case may be dismissed.[224]

Products Liability

Texas has a number of statutes that protect manufacturers, distributers, and sellers of products.

First, Texas law provides an "innocent retailer defense." A seller that did not manufacture a product is not liable for harm caused to a person by that product unless the person proves that the seller participated in designing the product; altered, modified, or installed the product; actually knew about a defect in the product but sold it anyway; controlled the contents of an inadequate warning that accompanied the product; or misled the purchaser about the aspect of the product that caused the injury.[225]

Second, Texas does not impose liability for use of some inherently unsafe consumer products. A manufacturer is not liable if a common consumer product that is intended for personal consumption is inherently unsafe and that is something that would be known to an ordinary consumer.[226] The statute lists some inherently unsafe products, including sugar, alcohol, tobacco, butter, and oysters.[227]

Third, in a products liability action brought against a manufacturer or seller of a firearm or ammunition that alleges a design defect in the firearm or ammunition, the burden is on the plaintiff to prove that the design of the firearm or ammunition was defective, causing the firearm or ammunition not to function in a manner reasonably expected by an ordinary consumer of firearms or ammunition.[228] In other words, there is no liability arising from the use of a firearm or ammunition that operates as intended.

Fourth, Texas law provides a rebuttable government-compliance defense for warnings that accompany pharmaceutical products. In a products liability action alleging that an injury was caused by a failure to provide adequate warnings or information with regard to a pharmaceutical product, there is a rebuttable presumption that the defendant is not liable with respect to the allegations involving failure to provide adequate warnings or information if the warnings or information that accompanied the product in its distribution were approved by the United States Food and Drug Administration.[229]

Finally, Texas law includes a rebuttable government-standards defense for all products. In a products liability action brought against a product manufacturer or seller, there is a rebuttable presumption that the product manufacturer or seller is not liable for any injury to a person caused by some aspect of the formulation, labeling, or design of a product if the product manufacturer or seller establishes that the product's formula, labeling, or design complied with mandatory safety standards or regulations adopted and promulgated by the federal government, or an agency of the federal government, that were applicable to the product at the time it was manufactured.[230]

Pandemic Liability

Most recently, Texas passed the Pandemic Liability Protection Act in response to the COVID-19 pandemic.[231] The statute provides retroactive civil liability protections for large and small businesses, religious institutions, nonprofit entities, healthcare providers, first responders, product manufacturers, and educational institutions for certain claims arising during a pandemic or pandemic-related disaster.[232]

In regard to liability protections for healthcare providers and first responders, the statute states that these potential defendants are not liable for an injury or death arising from care, treatment, or failure to provide care or treatment, relating to or impacted by a pandemic disease, if the provider proves: (1) a pandemic disease was a producing cause of the care, treatment, or failure to provide care or treatment that caused the injury or death; and (2) the injured individual was diagnosed or suspected of being infected with the pandemic disease; "[e]xcept in a case of reckless conduct or intentional, wilful, or wanton misconduct."[233] This high standard for imposing liability is intended to provide enough protection to healthcare providers that they will continue to treat patients during a pandemic—a societally beneficial goal.

The Pandemic Liability Protection Act also provides liability protection to manufacturers, sellers, and designers of products used to treat pandemic illnesses, used to protect healthcare workers from contracting a pandemic disease, or used to clean, sanitize, or disinfect.[234] These potential defendants may be held liable only if they have actual knowledge of a defect in a product or acted with actual malice in designing, manufacturing, selling, or donating the product, and the product presents an unreasonable risk of substantial harm to an individual using or exposed to the product.[235] There are similar protections when the claim relates to a failure to warn about alleged flaws in the product.[236] Here, the protection provided by the Texas Legislature was intended to encourage manufacturers to increase production of needed products, or produce products the manufacturer normally would not produce (such as a vodka distillery producing hand sanitizer).

Finally, the Act provides protection to businesses of all kinds, including, for example, retail stores, from claims that an employee or customer was exposed to a pandemic disease while visiting the business.[237] The statute relies on a "knowing" standard, providing that businesses are not liable unless they knowingly failed to protect the employee or customer from exposure to the pandemic disease or knowingly failed to implement government-promulgated standards, guidance, or protocols intended to lower the likelihood of exposure to the pandemic disease.[238] Modeled on Texas's healthcare liability statute, the pandemic liability protection statute also requires a plaintiff in an action against a business to serve an expert report providing the factual and scientific basis for the assertion that the defendant's failure to act caused the plaintiff to contract the disease.[239]

In this instance, the Texas Legislature was seeking to encourage businesses to comply with government mandates intended to protect employees and customers, while also encouraging businesses to reopen when the pandemic subsided.

Governmental Entity Liability

Once the state has assumed liability of a closed CO_2 storage reservoir, the Texas Tort Claims Act (TTCA) shields the state from certain liability.[240] The TTCA partially waives immunity for civil wrongs committed by governmental entities and their employees by allowing Texans to sue only in limited circumstances defined under the Act. A governmental unit is liable for:

1. property damage, personal injury, and death proximately caused by the wrongful act or omission or the negligence of an employee acting within his scope of employment if:
    A. the property damage, personal injury, or death arises from the operation or use of a motor-driven vehicle or motor-driven equipment; and
    B. the employee would be personally liable to the claimant according to Texas law; and
2. personal injury and death so caused by a condition or use of tangible personal or real property if the governmental unit would, were it a private person, be liable to the claimant according to Texas law.[241]

There are limits to the amounts of damages for which the state may be liable. Damages are limited to $250,000 per person and $500,000 per occurrence for bodily injury or death and $100,000 per occurrence for damaged property.[242] Exemplary damages against a governmental entity are not authorized under the TTCA.[243]

LIABILITY PROTECTION FOR CCUS OPERATIONS IN TEXAS

Long-term Liability: Yielding Ownership to the State

Both to encourage development of CCUS projects and for practical reasons,[244] Texas should allow operators of CCUS facilities (offshore and onshore) to yield ownership and control of CCUS facilities to the State of Texas after the project is officially closed. Yielding ownership to the state should end the producers', transporters', and operators' going-forward liability for that facility and the CO_2 it holds. This concept is already employed in Indiana, Louisiana, Montana, Nebraska, North Dakota, and Wyoming, as well as Texas in regard to the storage of some low-level radioactive waste and offshore carbon sequestration projects under the Texas Clean Air Act of 2009.

As discussed above, some of these states have a delay period between the date a sequestration site is closed and the date the state assumes ownership and control, but others do not.

- Indiana: No specified delay period. Upon issuance of a certificate of project completion, the state assumes responsibility for the site and liability, but no time period prior to issuance of a certificate or transfer of liability is stated.[245]

- Louisiana: Ten years after injection of CO_2 ceases, a certificate of completion may be issued, at which point the state assumes title to the site, and the prior operators are released from liability.[246]
- Montana: Twenty-five years after injections end at a site, a certificate of completion is issued, but the prior operator is not released from liability for an additional 25 years. [247]
- Nebraska: No specified delay period. The prior operator is released from liability when the state issues a certificate of completion, but no period for issuance of the certificate is stated.[248]
- North Dakota: Ten years after injections cease, a certificate of completion may be issued. After issuance, liability for and title to the site is transferred to the state.[249]
- Texas: No delay period in its 2009 Clean Air Act in regard to the state's assumption of ownership of and liability for offshore sequestration projects.[250]
- Wyoming: A 20-year monitoring period is imposed following the issuance of a certificate of project completion, after which time title is transferred to the state and the prior operator is released from liability.[251]

Texas should consider following the lead of the two states (Indiana and Nebraska) that do not have a lag period between the date a certificate of completion is issued and the date the state assumes ownership of and liability for the site. The elimination or reduction of the lag period would be an important element in encouraging the development of CCUS operations in Texas. At the same time, Texas should adopt rigorous prerequisites for the state to issue a certificate of project completion. The requirements should ensure that a certificate of completion—and, therefore, assumption of liability—is issued only when the state is confident the site is mechanically sound.[252] The relevant UIC program authority (which will be the state, once it has primacy) will be responsible for authorizing site closures.

Texas also should amend the 2009 Clean Air Act to provide that operators of offshore CCUS projects are relieved of liability for the facility and the captured CO_2 once control and ownership of the facility has been relinquished to the State of Texas, thus giving the same protections to operators as are given to producers under that Act.

Ongoing Liability During Site Operations

Before a certificate of completion is issued for a CCUS site, liability related to ongoing operations may arise from multiple events, and multiple individuals or entities may have claims. Transferring ownership of the site to the state does not mean the liability-causing events will end. While the chances of an event giving rise to liability tends to dissipate over the lifetime of a CCUS project, there may be events that result in liability for whomever owns the site.

As discussed above, the EPA's list of events related to injection and sequestration of CO_2 exhibits many potential liability-causing events that arise from captured CO_2 escaping into the surrounding environment. The list includes the following incidents that may result from escaped CO_2:

- contamination of shallower groundwater formations, including drinking water sources, through vertical migration of CO_2 in the subsurface;
- gradual leaks into the air from the injection well components or monitoring wells;
- sudden large accidental releases that could raise CO_2 concentration above safe levels for humans;
- elevated CO_2 concentrations in soils that could affect plants and animals; and
- elevated CO_2 concentrations in the subsurface that could affect microbial populations.[253]

The most effective method of mitigating these potential liabilities is for the CCUS site to be scientifically and mechanically sound. To help ensure soundness of the site, the EPA, as the grantor of permits for Class VI wells, has developed specific criteria for permit approval, which includes:

- extensive site characterization requirements;
- injection well construction requirements for materials that are compatible with and can withstand contact with CO_2 over the life of a geologic sequestration project;
- injection well operation requirements;
- comprehensive monitoring requirements that address all aspects of well integrity, CO_2 injection and storage, and ground water quality during the injection operation and post-injection site care period;
- financial responsibility requirements assuring the availability of funds for the life of a geologic sequestration project (including post-injection site care and emergency response); and
- reporting and recordkeeping requirements that provide project-specific information to continually evaluate Class VI operations and confirm USDW protection.[254]

The suitability of any particular injection site depends on many factors, including proximity to CO_2 sources, and other reservoir-specific qualities such as porosity, permeability, and potential for leakage.[255] For the CCUS industry to succeed in mitigating anthropogenic atmospheric emissions of CO_2, "it is assumed that each reservoir type would permanently store the vast majority of injected CO_2, keeping the gas isolated from the atmosphere in perpetuity."[256]

Operators doubtless benefit from conducting rigorous examinations and reviews of their sites and processes, which yields agency authorization, safer operations, and reduced liability-causing events.[257] "The expectation is that sites that meet certain qualifications will be able to demonstrate to the investment community that potential liabilities are understood, properly estimated[,] and financial assurances (in the form of any number of financial instruments such as surety bonds, letters of credit, insurance, self-insurance[,] or escrow accounts) against potential liabilities will be available."[258]

But even the most rigorously studied and tested site may have failures that allow CO_2 to escape. Furthermore, liability may arise from events other than the failure to prevent CO_2

from escaping during collection, transportation, injection, and sequestration. With this in mind, what should operators' liability look like? The following section endeavors to answer this question.

Liability for Environmental Damage Caused by Escaped CO_2. Undoubtedly, CCUS operations as a whole will need to be significantly regulated. Proposed CCUS sites will be subject to regulatory approval based on evidence the site will contain the sequestered CO_2 within specified geologic boundaries for an extended period of time. Existing sites also will be subject to ongoing monitoring, including pressure management. This necessity for regulation creates an opportunity for addressing potential liability for escaped CO_2.

As it has done in other contexts, Texas could create a presumption of nonliability or limited liability for a defendant CCUS operator and facility, and possibly for a producer or transporter of CO_2, if the defendant obtained governmental approval for the site or related activity and complies with applicable regulations. Texas has provided this kind of protection for manufacturers and sellers of products and for labeling of pharmaceuticals.[259]

As with the presumption of nonliability for pharmaceuticals, the presumption could be overcome by a showing that the defendant misled the regulatory agency to obtain approval of a site or approval of its operations (if approval of operations is a requirement). For example, if the operator of a CCUS site certified to the regulatory authority that its geological surveys indicated certain boundaries of a reservoir into which CO_2 would be injected, but its surveys, in fact, were uncertain about the boundaries of the reservoir, then the operator would not be entitled to the presumption of nonliability or limited liability in regard to a subsurface trespass or conversion claim by a pore space owner who did not consent to having CO_2 in his or her pore space. Similarly, if the failure to accurately ascertain the boundaries of the reservoir created the opportunity for CO_2 to escape, then claims by landowners and governmental entities that escaped CO_2 polluted water or land, or caused other injury to persons or property, also would not be subject to the presumption of nonliability or limited liability. Other comparable claims—such as claims for damages resulting from induced earthquakes—would be treated similarly.

If preapproval of operations is not required, but operations are regulated to ensure the safety of workers, the public, or property, the presumption of nonliability or limited liability might be rebutted by evidence that the defendant's actions were more than merely negligent, such as requiring proof the defendant acted willfully, knowingly, or grossly negligently in failing to comply with safety statutes or regulations. For example, if regulations allowed injection of CO_2 at or below a certain pressure, but the CCUS site operator injected CO_2 at a higher pressure, the operator's liability for an induced earthquake caused by the excessive injection pressure would not be limited. Texas law already uses heightened standards for proving liability in many statutes including, for example, to rebut a presumption of nonliability in the 2021 pandemic liability statute.[260]

Should potential defendants who comply with government regulations be immune from liability or, instead, should their liability be limited to some extent? Policy arguments can be made for either conclusion. Indiana's CCUS statute provides that damages recoverable from the storage operator for subsurface trespass are limited to "the loss of a nonspeculative value resulting from the injection and migration of carbon dioxide beyond the storage facility."[261] Louisiana law provides noneconomic damages caps applicable to CCUS-engaged entities and the state, before and after ownership of the facility is transferred to the state, at $250,000 per occurrence, or $500,000 for more severe injuries relating to CCUS operations.[262]

Following the leads of Indiana and Louisiana, Texas policymakers should consider capping or prohibiting the recovery of noneconomic damages (but not actual damages) when the producer, transporter, or operator complies with government regulations. If such a liability scheme were implemented, a CCUS operator that fully complied with governmental regulations would not have to pay damages for mental anguish, for example, related to an induced earthquake or pollution of soil or groundwater, but would have to pay for the actual cost to rebuild damaged buildings or remediate polluted land or water. Capping or disallowing noneconomic damages would not be new to Texas, given that Texas caps noneconomic damages in healthcare liability cases and caps the total amount of damages that may be imposed on governmental entities in all circumstances.[263]

In an action alleging inverse condemnation, subsurface trespass, conversion, nuisance, or another cause of action asserting an interference with the use and enjoyment of property resulting from escaped or migrated CO_2, one additional protection should be considered—requiring an expert witness report to be filed at the outset of the case. Following the examples provided in healthcare liability cases, lawsuits claiming a business exposed an employee or customer to a pandemic disease, and lawsuits against architects and engineers, the required report would explain the factual and scientific basis for the claim and the causal connection between the CCUS facility's actions and the alleged trespass or contamination.

Finally, Texas should prohibit local governmental entities from pursuing enforcement actions against CCUS operators under Texas Water Code section 7.351 in instances when the state itself has already taken or is taking action to resolve alleged violations of environmental laws. The Water Code gives both the state and local governments the right to pursue actions to address environmental damage. On multiple occasions in the past, the state regulator (typically TCEQ) worked with the owner of a site to remediate environmental damage caused by an event. The state ultimately would be satisfied with the remediation and would release the site owner. But then, a local governmental unit would sue the site owner seeking to collect substantial penalties for the same environmental event. These abusive penalty-seeking lawsuits should not be allowed against CCUS operators or facilities that have already been subject to enforcement actions by state or federal regulators.

Tort and Contract Liability. The possibility that an event will give rise to liability is present in all phases of a CCUS operation, as is the case with any enterprise. At the capture stage of a CCUS project, a company may be liable for the malfunction of the equipment or machinery used to capture CO_2, thus preventing the company from capturing the quantity of CO_2 it contracted to capture. This event could create liability for breach of contract, or it could be subject to administrative penalties if the malfunction caused the company to be in violation of its permit. A company could also be liable in tort if malfunctioning equipment causes personal injury or death. In either case, CCUS operations are not unique, and, therefore, existing Texas law would govern any civil or administrative actions.

At the transportation phase, as another example, if a truck carrying CO_2 collides with a passenger car and causes personal injury, that lawsuit would not warrant special protection and, therefore, would be covered by current Texas liability laws.

In sum, to the extent CCUS operations give rise to events that are common for all businesses and industries—workplace injuries, vehicular collisions, and other such things—the need to provide special protection for CCUS operations is not apparent.

Actions to Impede CCUS Development. It is conceivable that attempts will be made to impede CCUS development through litigation. In Texas and around the country, state and local governmental entities have used public nuisance lawsuits as attempts to stifle lawful activities, such as the production of oil and gas. Typically, these lawsuits seek to enjoin the activity, but often they demand recovery of damages of such magnitude that the industry cannot survive if the lawsuit prevails. In the context of CCUS operations, a claim might be made, for example, that capturing and storing CO_2 encourages production of fossil fuels and, therefore, indirectly causes climate change. Texas policymakers should consider preventing these kinds of policy-based actions from coming to fruition.

Prohibiting governmental entities and individuals from pursuing "public nuisance" claims that seek to impose policy decisions through litigation is an important safeguard for the CCUS industry. That is to say, plaintiffs would not be allowed to assert in a lawsuit that, even though the CCUS operation was permitted and lawful, it nonetheless constitutes a nuisance that should be abated and for which damages should be paid.

Local governments could still pursue nuisance claims to abate action of the kind that is historically addressed by nuisance lawsuits—those actions that are actually injurious to public health and safety. For example, the release of CO_2 into the air, ground, or water in quantities that is sufficient to cause harm to persons or the environment may be addressed as a nuisance. But a claim that the mere existence or operation of a CCUS facility is a nuisance would not be cognizable. And individuals still could pursue common law nuisance claims, but would be required to show an injury not shared by the public at large, as has historically been required in nuisance actions.

Texas policymakers have not yet limited the use of public nuisance actions in any context, but they have prohibited injunction actions by individuals and local governments that would impede space flight operations.[264] Preventing such injunction actions is a step along the same path as prohibiting public nuisance actions. Furthermore, Nebraska and North Dakota both provide that CO_2 is not a nuisance, which may be sufficient to prevent the improper use of public nuisance causes of action. Nebraska law provides that "carbon dioxide streams stored, and which remain in storage under a commission permit, are not a pollutant and do not constitute a nuisance."[265] In North Dakota, sequestered CO_2 that remains in storage under a commission permit "is not a pollutant nor does it constitute a nuisance."[266]

CONCLUSION

Regardless of political views or beliefs with respect to climate change, CCUS is beneficial and currently necessary. CCUS is good for the environment and good for Texas's economy and energy industry. Texas is uniquely situated to be the powerhouse of CCUS. Texas has an enormous capacity for CO_2 storage, and these reservoirs are an economic opportunity waiting to be utilized. Allowing Texas to assume long-term liability of CCUS projects encourages development in the state, thereby creating more jobs.

According to a recent study, "Texas has the opportunity to create an annual average of up to 18,350 project jobs over a 15-year period and 9,230 ongoing operations jobs through the deployment of carbon capture at 95 industrial and power facilities. The retrofit of equipment at these facilities has the potential to capture nearly 161 million metric tons of carbon dioxide (CO_2) per year. Along with the development of CO_2 transport infrastructure, this would generate up to $59.9 billion in private investment."[267]

Texas will not cease utilizing fossil fuels in the foreseeable future. To prevent the possible negative effects to the atmosphere and climate change, Texas should enact legislation to aggressively encourage CCUS operations by assuming long-term liability of the sequestered CO_2.

ENDNOTES

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47 *Id.*

48 *See infra* CCUS in Texas: Existing CCUS Laws in Texas: 2021: UIC Primacy in Texas.

49 *See* 40 C.F.R. § 146.91(e).

50 *See id.* §§ 146.91(a)–(d), 146.93.

51 *See id.* § 146.93(a)(1) ("The owner or operator must submit the post-injection site care and site closure plan as part of the permit application to be approved by the [state] Director."). However, a state with primacy may specifically allow for a requirement to the contrary. *See infra* CCUS Across the United States: Indiana.

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53 15 U.S.C. §§ 717(b) (regulation of interstate natural gas pipelines), 717(c) (regulation of rates), 717f(e) (siting).

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99 § 38-22-17(4).
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107 *See id.* § 1 (to be codified at Wyo. Stat. § 35-11-319).
108 *See id.* (to be codified at Wyo. Stat. § 35-11-319(d)(i), (vi)).
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210 *See* Univ. of Tex. at Arlington v. Williams, 459 S.W.3d 48, 52 (Tex. 2015).

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216 *See* § 74.302(a).

217 *See* § 74.351(a), (r)(6).

218 *See* § 74.351(b).

219 § 74.153(a).

220 § 74.151(a).

221 § 74A.002(a).

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223 *See* § 150.002(a), (b).

224 *See* § 150.002(c), (d).

225 *See* § 82.003(a).

226 *See* § 82.004(a).

227 *See* § 82.004(a)(2).

228 *See* § 82.006(a).

229 *See* § 82.007(a).

230 *See* § 82.008(a).

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232 *See* §§ 74.155, 148.003, 148.004.

233 § 74.155(b).
234 § 148.002.
235 § 148.002(b).
236 § 148.002(c).
237 § 148.003(a).
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239 § 148.003(b).
240 *See* § 101.021.
241 *Id.*
242 § 101.023(a).
243 § 101.024.
244 It may be presumed that the state will exist into perpetuity, while private entities probably will not. Thus, as a practical matter, the state is eventually going to assume responsibility for CO_2 sequestration sites.
245 *See* Ind. Code § 14-39-2-13(d).
246 *See* La. Stat. § 30:1109(A)(1).
247 *See* Mont. Code § 82-11-183(3), (6).
248 *See* Neb. Rev. Stat. §§ 57-1618, -1619(5).
249 *See* N.D. Cent. Code § 38-22-17(4), (6).
250 *See* Tex. Health & Safety Code §§ 382.507, 382.508.
251 *See* S. File 47, 66th Leg., Budget Sess., § 1 (Wyo. 2022) (to be codified at Wyo. Stat. § 35-11-319).
252 The criteria to obtain a certificate of completion used in other states is provided earlier in this paper. Which state's criteria are most appropriate and should be duplicated in Texas, if any, is beyond the scope of this paper.
253 *See* Jones, *supra* note 156, at 12; *see also supra* text accompanying note 182.
254 *Class VI – Wells Used for Geologic Sequestration of Carbon Dioxide,* EPA, https://www.epa.gov/uic/class-vi-wells-used-geologic-sequestration-carbon-dioxide (last updated Mar. 8, 2022).
255 *See* Jones & Lawson, *supra* note 19, at 9.
256 *Id.*
257 Medlock & Miller, *supra* note 153, at 11.
258 *Id.*
259 *See supra* text accompanying notes 225–30.
260 *See supra* text accompanying notes 231–39.
261 Ind. Code § 14-39-2-12(c). Punitive damages may be sought by a surface or subsurface owner only if the storage operator violates UIC Class VI permit requirements or acts with reckless disregard of public safety. § 14-39-2-12(d).
262 *See* La. Stat. § 30:1109(B).
263 A cap on noneconomic damages is permitted by the Texas Constitution. *See* Tex. Const. art. III, § 66.
264 *See supra* text accompanying notes 203–07.
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