



LONG-TERM STEWARDSHIP AND LIABILITY

A Balanced Approach to Legal Certainty and Site Transfer for Geologic CO₂ Storage

SEPTEMBER 2024



GLOBAL CCS
INSTITUTE



GLOBAL CCS
FOUNDATION

IAN HAVERCROFT
Global CCS Institute

CHIARA TRABUCCHI
Fiori LLC

1.0 ISSUE

The long-term stewardship of CO₂ storage operations, including the management of associated liabilities, is frequently raised by policymakers, regulators, project proponents and the wider public as a critical consideration in the broadscale development and operation of carbon storage projects. For some parties, these twin issues are perceived as a potential barrier to the widespread deployment of the technology.

Geologic CO₂ storage is estimated by the IPCC to permanently sequester captured carbon for 10,000 years or longer, if projects are selected and managed properly.¹ The extended life of these projects necessitates consideration of several variables that directly impact the safe and perpetual geologic storage of CO₂. For example, most businesses enjoy finite lifecycles – an original storage operator may cease to exist in the decades or more necessary to manage a carbon capture and storage project from post-injection through demonstration of secure and perpetual storage. The need for long-term stewardship arrangements that assure sufficient financial resources exist to pay for the safe and permanent geologic storage of CO₂ is clear. However, it is far from clear that these circumstances justify special treatment with respect to legal liability transfer or unfettered relief from post-injection financial responsibility.

In some jurisdictions, CO₂ storage operators have demanded relief from any and all liability following the issuance of a “closure certificate” from a competent authority. These demands appear to be predicated on the premise that: first, absent such relief, carbon capture and storage projects suffer from open-ended “risk”; and second, financiers have no appetite for such projects with open-ended risk. Notably, the demand for relief ranges from regulatory liability to more expansive

formulations of relief that include relief of contractual, civil, and even criminal liability.²

Outside of the Price-Anderson Nuclear Industries Indemnity Act, which governs liability-related indemnity for non-military nuclear facilities constructed in the United States, the transfer of legal liability and associated long-term financial responsibility from a private, industrial actor to a sovereign or government entity is exceedingly rare.

Notwithstanding the rarity of these provisions, some governments have considered, and subsequently proposed, the assumption of liabilities as a means of demonstrating the public importance of geologic storage. Furthermore, policymakers have sought to adopt such provisions as a means of incentivizing deployment and assuring the public that there will be an entity responsible in the future.³ For example, in the US, several states are contemplating legislative proposals to promote CCS, inviting associated economic development to their state.⁴ As part of these efforts, some states allow for qualified transfer of CCS-related liability to the state.⁵

It is the authors’ belief that providing industrial actors with broad liability and financial responsibility relief can contribute to moral hazard, wherein the risks of an unplanned event increase, because the responsible party (in this case the CO₂ storage operator) is partially or fully insulated from being held fully liable for the harm that results from their actions. In other words, if CO₂ storage operators are prematurely exempted from liability, they arguably will be less careful in their siting and operating decisions; and, as a result, event-based risks may increase, because the chances of an unpredictable event occurring due to poor siting and/or poor operating decisions increases.

ACKNOWLEDGEMENTS

The authors would like to acknowledge with gratitude the support and contributions offered by the Environmental Defense Fund and the Global CCS Institute Foundation.

¹ See IPCC Special Report on Carbon Dioxide Capture and Storage. 2005. Chapter 5, Underground geological storage. https://www.ipcc.ch/site/assets/uploads/2018/03/srccs_chapter5-1.pdf

² Civil liability varies by domestic and international jurisdictional authority. However, regardless of jurisdiction, liability related to CO₂ geologic storage generally covers a range of actions, including for example, leakage, trespass, nuisance, contamination, and/or property damage.

³ Bankes, N. (2019) ‘Alberta’s approach to the transfer of liability for carbon capture and storage projects’, *Int. J. Risk Assessment and Management*, Vol. 22, Nos. 3/4, pp.311–323.

⁴ <https://www.nixonpeabody.com/insights/articles/2022/05/02/states-look-to-attract-ccs-projects-through-laws-shifting-long-term-CO2-storage-liabilities>

⁵ See Illinois’ Safety and Aid for the Environment in Carbon Capture and Sequestration Act (SAFE CCS Act), 10300SB1289enr (ilga.gov)



Importantly, a skeptical public already scarcely believes policymakers and industry representatives when they insist that carbon capture and storage is well-understood and safe – telling the public that geologic storage projects will proceed at commercial-scale only if the liability of CO₂ storage operators is relieved, on the contrary, only serves to further erode public trust.

The authors believe there is the potential for a middle way – a balanced approach that offers regulatory certainty, while avoiding the pitfalls of moral hazard and, at the same time, fostering broader public trust.

In fact, the science tells us that properly sited and prudently operated geologic storage projects are highly likely to permanently store CO₂. The regulatory structure underpinning the permitting of carbon capture and storage projects is designed to minimize and mitigate risks. And, of equal importance, the insurance sector has affirmed that what small risk remains can be managed by a growing commercial risk management sector.⁶ To the extent further hedges are necessary, experience tells us that temporal, general purpose limitations to liability, already present in common and statutory law, likely suffice.

Nevertheless, some jurisdictions remain concerned about the potential for “frivolous” lawsuits. To guard against this risk, jurisdictional authorities may elect to provide additional legislative certainty to financiers and carbon storage project developers. For those jurisdictions, the authors provide a framework that mitigates the risk of operator liability upon receipt of a closure certificate from competent authorities, while also balancing the risk of unintended consequences arising from moral hazards that can erode the public trust.

The framework proposed by the authors accomplishes the dual purpose of creating legal certainty and ensuring that jurisdictional authorities accepting geologic site transfer(s) are adequately resourced. Specifically, the proposed framework accomplishes the goal of ensuring that these jurisdictions are sufficiently capitalised to deal with routine, “no-fault” long-term monitoring and maintenance after site closure is complete, and to respond to circumstances that may arise after post-injection site care is complete and the CO₂ storage operator has been formally relieved of their financial assurance obligations by a competent authority.

The following liability framework and accompanying stewardship funding mechanism are tailored to US state policymaking, but both are equally applicable (with modification) to jurisdictions worldwide.

⁶ See CCUS: Dispelling myths about risk. Frederick Eames, Chiara Trabucchi and Daniel McGarvey. Hydrocarbon Processing, 2 December 2022. <https://www.hydrocarbonprocessing.com/news/2022/12/online-feature-ccus-dispelling-myths-about-risk>. See also Lessons and Perceptions: Adopting a Commercial Approach to CCS Liability. Ian Havercroft. Global CCS Institute. 14 August 2019.

2.0 SITE CLOSURE AND TRANSFER OF OVERSIGHT

The extended timeframe associated with carbon capture and storage operations, together with the obligation to ensure the permanent geological storage of the CO₂, has proven a significant concern for some investors and project proponents. The potential for liabilities that trail site closure, and which may be held in perpetuity, have been highlighted as a barrier to commercial-scale deployment of the technology. To address these concerns, regulators and policymakers in several jurisdictions have introduced legislative provisions with the express goal of transferring oversight for a storage site or stored CO₂, to the state or other governmental jurisdiction, at an agreed point in time.

The conditions that will enable these transfers to take place, and the nature of the transfer itself, have been the subject of significant debate amongst regulators, CO₂ storage operators, and the wider public. Close scrutiny of these regimes is essential to determine how these mechanisms will operate in practice and which forms of liability are addressed by a potential transfer.

2.1 Conditions for Transfer

Many of the early transfer regimes include provisions, in the form of a series of pre-conditions that are to be fulfilled, upon permanent cessation of injection operations, or at the point of surrender of the title to the facility. In all instances, the objective of these measures is to provide the relevant authority with a clear picture of a site's stability and safety, as well as enabling a determination of any associated future risks and costs.

The nature of these conditions varies between regulatory regimes. In the EU, for example, the storage Directive includes explicit performance criteria and requires that *"all available evidence indicates that the stored CO₂ will be completely and permanently contained"*.⁷ In some jurisdictions, the legislation also contains strict conditions to enable the transfer, while others afford a minister or relevant authority greater discretion to make a determination.

In all instances developed to-date, whether in the EU or the US, the CO₂ storage operator must evince completion of post-injection site care for a defined time period, prior to a transfer being authorised. While the duration of this period varies between jurisdictions, to date, it is clear that CO₂ storage operators retain all liabilities and attendant financial obligations, until such time as they receive a site closure certificate from a competent authority. However, substantial debate remains (real or perceived) as to who remains responsible for these potentially long-tailed liabilities and attendant financial responsibilities after site closure – specifically, under what conditions can or should the CO₂ storage operator be relieved of their liability, and the geologic storage project be transferred to a governmental authority for perpetual long-term stewardship.⁸

2.2 A Proposed US Model⁹

In the United States, the need for legal and financial certainty often is referenced by proponents of carbon capture and storage as a barrier to commercial-scale deployment. A solution proffered by many proponents of geologic storage is the transfer of site oversight to a

⁷ See Implementation of Directive 2009/31/EC on the Geological Storage of Carbon Dioxide. Guidance Document 3. Criteria for Transfer of Responsibility to the Competent Authority. ISBN-13 978-92-79-18472-7.

⁸ For a discussion of the issues surrounding the transfer of liability see: Havercroft, I., 2018, Long-Term Liability and CCS, in Carbon Capture and Storage: Emerging Legal and Regulatory Issues, (2nd Ed), Havercroft, I., Macrory, R. and Stewart, R. B., (eds), Hart Publishing, Bloomsbury, 2018.

⁹ Although the model discussed in this paper is tailored to address US jurisdictional concerns. The authors believe that design elements related to the financial structure could be broadly applicable internationally.



public authority (e.g., state or governmental jurisdiction) after site closure. Importantly, the conditions under which such a transfer might occur will dictate whether carbon storage project developers operate sites safely and soundly, remaining financially responsible for their actions, or whether they benefit from an unfettered social license to operate contributing to moral hazard.¹⁰

As more and more states seek primary enforcement authority (or primacy) to implement their EPA-approved underground injection control program for carbon capture and storage, decisions are being made by state legislatures as to how best to manage the end of the geologic storage lifecycle. Specifically, states interested in Class VI primacy are weighing options to accept the transfer of carbon capture and storage project ownership and liability after site closure is complete.¹¹

It is against this backdrop that decisions regarding the “how” and the “when” of such transfer, including conditioned legal relief, will influence the extent to which CO₂ storage operators in the US realize legal and financial certainty without compromising their projects or the public trust. Any financial responsibility regime must be structured to ensure that the public is not left with an unfunded suite of liabilities for which the taxpayer is left financially responsible.

Recognizing the tension that exists between legal and financial relief, the authors offer the following straw proposal to foster the certainty necessary to advance commercial-scale deployment of carbon capture and storage, while at the same time minimize (if not eliminate) the potential for unintended consequences arising from moral hazard.

The following framework presupposes that it is in the public interest to promote the advancement of geologic storage as part of a diversified portfolio of climate mitigation strategies. It also presupposes that the advancement of well-sited, well-constructed, and well-operated CO₂ storage projects will contribute to the betterment of regional economies across the United States and globally.¹² Specifically, the framework is designed in three parts: (1) a “trust” fund that is designed as a special fund in the state treasury; (2) fees imposed by the state regulatory agency to cover the cost of storage-related activities; and (3) transfer of site oversight and structured legal relief.

¹⁰ Moral hazard relates to the increased probability of an adverse outcome, because the entities responsible for minimizing the potential for harm or injury are insulated from the consequences of their actions.

¹¹ Some states have enacted statutes to clarify the extent to which the state will take on an operator’s post-closure responsibilities, consistent with the authors’ approach and the federal Class VI program. Lawmakers in Colorado, for example, enacted such a statute in 2023 and included an explicit statement that liability remains with the operator post-closure. (Colorado Revised Statutes 34-60-106 (c)(IV)(D).)

In North Dakota, the statute only releases operators from “regulatory requirements associated with the storage facility,” (NDCC 38-22-17 (6)) which also occurs upon site closure under the federal rule, 40 CFR 146.93(b).

Another group of states has sought to offer some limited transfer of liability from operators to the state upon a regulator’s approval of site closure. Louisiana’s statute explicitly disallows operators who engaged in regulatory noncompliance which occurred before site closure was approved from being able to transfer duties, obligations, and liability to the state. Additionally, Louisiana will not take on liability when it is determined that an operator “intentionally and knowingly concealed or intentionally and knowingly misrepresented material facts related to the mechanical integrity of the storage facility or the chemical composition of any injected carbon dioxide.” The operator retains all duties, obligations, and liability if and when the State’s Carbon Dioxide Geologic Storage Trust Fund lacks adequate funds to address or remediate a Class VI issue in the post-closure period. Subject to those limitations, however, the state releases operators from civil, criminal, and contractual liability.

¹² Trabucchi, C., 2008, Storing Carbon: Options for Liability Risk Management, Financial Responsibility, in World Climate Change Report, Vol. 2008, No. 170, Trabucchi, C., and Patton, L. The Bureau of National Affairs. 09/03/2008.

2.2.1. Creation of a Carbon Dioxide Storage Trust Fund

The Carbon Dioxide Storage Trust Fund is created as a special fund in the state treasury. The Fund is interest-bearing, whereby the interest earned on money held in the Fund is deposited to the credit of the Fund.

All fees collected by the state's regulatory agency, the nature of which is discussed in the next section, are deposited to the credit of the Carbon Dioxide Storage Trust Fund. In addition, penalties imposed on the CO₂ storage operator for violations, monies received by the state regulatory agency from financial responsibility instruments associated with carbon storage permits, and monies received by the state regulatory agency from the CO₂ storage operator after site closure, also are deposited to the credit of the Fund.

An important cornerstone of the Fund is that it should be used only by the regulatory agency, and only to pay for expenditures related to carbon storage projects, including:

1. Permitting, inspecting, monitoring, investigating, recording and reporting on geologic storage facilities and associated carbon dioxide injection wells;
2. Long-term monitoring of geologic storage facilities and associated carbon dioxide injection wells;
3. Remediation of mechanical problems associated with geologic storage facilities and associated carbon dioxide injection wells;
4. Repairing mechanical leaks at geologic storage facilities;
5. Plugging abandoned carbon dioxide injection wells used for geologic storage;
6. Training and technology transfer related to carbon dioxide injection and geologic storage; and
7. Oversight and management of the geologic storage facilities and associated carbon dioxide injection wells after site closure.

An important aspect of the proposed framework is that monies held in the Fund for the protection of the public trust should not be used to pay for expenditures or activities unrelated to CO₂ storage sites that have been transferred to the jurisdictional authority. To do otherwise increases the risk that insufficient funds will be available to pay for activities related to monitoring and overseeing sites following site transfer, and that any such unfunded liabilities will become the financial burden of the jurisdiction's taxpayers.

2.2.2. Financing the Carbon Dioxide Storage Trust Fund: Assessing and Collecting Carbon Storage Fees

The concept of a fee-based Trust Fund for CO₂ storage is not new, has been put forward in a number of forums, and, in fact, forms the basis of several legislative proposals.^{13,14} The challenge with many of the proposals to date is that they fail to right-size the fee structure to ensure the fees are tailored to each geologic storage site, and in so doing fail to ensure a balanced accumulation of monies in Trust.

Importantly, any financing structure that is predicated on paying first dollar loss from the trust fund, and not from the operator of the storage site, runs the risk that the CO₂ storage operator will be indifferent to the financial consequences of their operational decisions. This indifference may result in the CO₂ storage operator failing to act during the injection period, to prevent or mitigate future losses, because they believe themselves financially insulated from the consequences of their operational decisions once the site is closed and transferred to a state authority or other governmental jurisdiction.

To minimize this risk, the authors believe it is important that any geologic storage fee structure avoid a flat fixed per ton fee assessed on each ton of stored CO₂. Instead, the authors propose a structure that encourages state regulatory agencies to impose fees that are tailored to the specific characteristics of the carbon capture and storage site. These fees should be sufficient to cover the cost of:

¹³ Dooley, J.J., 2010, Design Considerations for Financing a National Trust to Advance the Deployment of Geologic CO₂ Storage and Motivate Best Practices, in International Journal of Greenhouse Gas Control, 4 (2010) 381-387, Dooley, J.J., Trabucchi, C., and Patton, L. 2010.

¹⁴ Alaska (AS § 3714.850), Illinois (415 ILCS § 5/5913), Indiana (Ind. Code § 14-39-2-10), Kansas (Kan. Stat. § 55-1638), Louisiana (La. Stat. § 30:1110), Mississippi (Miss. Code Ann. § 53-11-23), Montana (Mon. Code Ann. § 82-11-181), Nebraska (Neb. Rev. Stat. § 57-1617), North Dakota (N.D. Admin. Code § 43-05-01-17), Oklahoma (Okla. Stat. § 27A-3-4-104), Texas (Tex. Nat. Res. Code § 121.003), Utah (Utah Code Ann. § 40-11-21), West Virginia (W. Va. Code §§ 22-11B-15), and Wyoming (Wyo. Stat. Ann. §§ 35-11-313 & -320) have established trust funds to manage post-closure activities.

1. Permitting, monitoring, and inspecting carbon dioxide injection wells for geologic storage and geologic storage facilities, including related enforcement and implementation expenditures; and
 2. Oversight and management of geologic storage facilities and associated carbon dioxide injection wells after site closure.
- The remaining 50 percent of these fees should be held in escrow by the geologic CO₂ storage operator pursuant to rules adopted by the state's regulatory agency, provided that such rules should permit investment of the escrowed funds by the CO₂ storage operator.¹⁵
 - Separately, 100 percent of the fees assessed by the regulatory agency for the purpose of overseeing and managing geologic storage facilities and associated carbon dioxide injection wells after site closure should be held in a separate escrow by the CO₂ storage operator pursuant to rules adopted by the regulatory agency, provided that such rules shall permit investment of the escrowed funds.

The above array of fees is consistent with many states legislative proposals in the US involving geologic storage. Of interest to the authors is how these fees will be financially managed once assessed and collected. A successful financial management structure will balance financial responsibility between the governmental authority and the CO₂ storage operator. In so doing, there is greater probability of avoiding adverse site selection due to moral hazard and reducing the risk that unfunded liabilities after site closure will become the burden of the state (and by extension the taxpayer).

Segregating and Investing Geologic Storage Fees

First, the authors argue that any fees imposed for the purpose of covering the costs described above should be levied on the operators of each individual geologic CO₂ storage facility, based on an assessment by the regulatory agency of the present value of the anticipated cost of oversight and management of the geologic storage facility and associated carbon dioxide injection wells after site closure. Tailoring the annual fees paid by each CO₂ storage operator to the specifics of their individual sites will foster sound site selection, reward good operational behaviour, and over the long term mitigate the risk of unfunded liabilities.

Second, all annual fees assessed by the regulatory agency to CO₂ storage operators should be segregated as follows:

- 50 percent of the fees assessed by the regulatory agency for the purpose of covering permitting, monitoring, and inspecting carbon dioxide injection wells for geologic storage and geologic storage facilities, as well as for the purpose of enforcing and implementing the state's regulatory program, should be deposited immediately to the credit of the state's Carbon Dioxide Storage Trust Fund.

This framework assumes that the CO₂ storage operator remains financially responsible during the injection period through a period of post-injection site care until site closure is approved, consistent with the programmatic requirements promulgated by the United States Environmental Protection Agency's Underground Injection Control program for Class VI wells.¹⁶ At the time site closure is approved by a competent authority, the CO₂ storage operator may make an application to transfer oversight and management of the geologic storage facility to the state. Upon receipt and approval of such application by the jurisdictional authority, the storage operator should deposit to the credit of the Carbon Dioxide Storage Trust Fund, monies accumulated by the storage operator in escrow per the above parameters.

Allowing the CO₂ storage operator to invest the portion of fees held in escrow encourages the sustained financial responsibility of the CO₂ storage operator. As a stop-gap measure, to ensure that only the funds necessary for long-term care expenses are transferred to the Fund, the total amount credited by the storage operator should not exceed the anticipated cost of oversight and management following closure of the geologic storage facility and associated carbon dioxide injection wells, as determined by the state's regulatory authority. Excess funds held in escrow, after all necessary amounts have been credited to the Carbon Dioxide Storage Trust Fund, should be released back to the geologic storage operator.

¹⁵ Escrow means to place in trust with a third party to be held segregated from other funds for the secured interest of the regulatory agency.

¹⁶ See the financial responsibility provisions at 40 C.F.R. 146.85.

This private-public sharing of financial management during the injection period offers the state a measure of financial security in so far as funds are transferred to the state during the period when the CO₂ storage operator is likely to be in receipt of positive cash flow. Concurrently, this financial management structure offers the storage operator a measure of financial certainty that a portion of its fees paid will remain available to pay for activities related to its site, after site closure, and are less likely to be appropriated to cover the losses associated with an unaffiliated CO₂ storage site.

2.2.3 Release and Transfer of Title to the State

Contingent on the following three events occurring, the authors believe that release and transfer of title to the stored or injected carbon dioxide, including oversight of any facilities used to inject or store such carbon dioxide, to a state authority or governmental jurisdiction may be appropriate:¹⁷

1. Site closure has been approved by the state regulatory agency,
2. The regulatory authority has received and approved an application from the geologic storage operator for transfer of oversight and management of the geologic storage facility, and
3. Monies held in escrow by the storage operator have been transferred to the Carbon Dioxide Storage Trust Fund.

For the avoidance of doubt, the authors believe that upon the issuance of a certificate of completion of injection operations, or similar documentation, the geologic CO₂ storage operator can be released from all further state regulatory agency liability associated with the project except such release should not include criminal, contractual or civil law liability. Further, the authors do not believe that liability should be released and transferred to the state in instances when:¹⁸

1. The operator or generator violated a state regulation prior to approval of site closure and any applicable statute of limitation has not run;
2. The regulatory agency determines, after notice and hearing, that the operator or generator provided deficient or erroneous information that was material and relied upon by the regulatory agency to support approval of site closure;
3. Liability arises from operator or generator conduct associated with the project which, if known, would have materially affected the decision of the state regulatory agency responsible for issuing the certificate;
4. The regulatory agency determines, after notice and hearing, that there is fluid migration for which the geologic storage operator is responsible, and such migration causes or threatens imminent and substantial endangerment to an Underground Source of Drinking Water;¹⁹ or
5. The regulatory agency determines that neither the Carbon Dioxide Storage Trust Fund nor amounts held in escrow by the geologic storage operator are sufficient to cover expenditures arising from the geologic storage facility.

The authors believe that, when viewed holistically, the proposed financial structure and legal relief framework work together to minimize moral hazard, because the geologic CO₂ storage operator has a vested financial interest in ensuring sufficient funds exist at the time of site closure to facilitate release and transfer of title to the state. Further, tailoring the financial structure to be site-specific, rather than a firm fixed pay-to-play scheme, minimizes a race to the bottom where any geologic storage operator, regardless of operational performance, receives first dollar indemnity.

¹⁷ The authors believe that questions remain regarding the nature of title transfer of CO₂ that are separate from the issue of liability relief. These broader issues of title transfer are outside the scope of this paper.

¹⁸ The authors recognize that there are a range of views regarding the conditions under which liability should be released and transferred to the state. This list of instances reflects the views of the authors.

¹⁹ This instance reflects the parameters underpinning the US EPA's regulatory oversight Class VI underground injection wells, and its broader mandate to ensure the non-endangerment of underground sources of drinking water. However, this element of the proposed model could be broadly applied to reference other jurisdictional mandates intended to protect against harm arising from CO₂ leakage from a geologic storage zone.



GLOBAL CCS
FOUNDATION

Global CCS Foundation
2101 L Street, NW
Suite 300
Washington, D.C, 20037

info@globalccsfoundation.org
globalccsfoundation.org



GLOBAL CCS
INSTITUTE

Global CCS Institute
Level 23, Tower 5
727 Collins Street,
Docklands, Victoria 3008
Australia

+61 03 8620 7300
info@globalccsinstitute.com
globalccsinstitute.com

Copyright © 2024 Global CCS Institute

The Global CCS Institute and the authors believe that this document represents a fair representation of the current state of law in the key areas and jurisdictions considered, however its content should not be construed as, or substituted for, professional legal advice. The Global CCS Institute has tried to make information in this publication as accurate as possible. However, it does not guarantee that the information in this publication is totally reliable, accurate or complete. Therefore, the information in this publication should not be relied upon when making investment or commercial decisions or provided to any third party without the written permission of the Global CCS Institute. The Global CCS Institute has no responsibility for the persistence or accuracy of URLs to any external or third-party internet websites referred to in this publication and does not guarantee that any content on such websites is, or will remain, accurate or appropriate. To the maximum extent permitted, the Global CCS Institute, its employees and advisers accept no liability (including for negligence) for any use or reliance on the information in this publication, including any commercial or investment decisions made on the basis of information provided in this publication.