Geologic Storage Stewardship Fees: Nationwide Analysis and Recommendations for State of Colorado

Colorado Energy and Carbon Management Commission

State of Colorado

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Accessibility Statement:

The State of Colorado is committed to providing equitable access to our services. This report is a 42-page white paper about fees for long-term geological stewardship by the State (focused on Class VI UIC projects) and includes text and one figure. For personalized accessibility assistance using this report, please contact us by email at DNR_ECMC@state.co.us or by phone at 303-894-2100. We will contact you directly within three business days. Visit our accessibility webpage for more information and services, including AIRA, our free service for blind and low-vision users.

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Executive Summary

Colorado House Bill (HB)25-1165[1] established a Geologic Storage Stewardship Enterprise ("the Enterprise") to ensure that costs associated with long-term stewardship (LTS) of geologic storage facilities are borne by geologic storage operators. At site closure, which occurs only after a number of requirements are satisfied, site responsibilities for the storage facilities are transferred to the state and regulatory liabilities are released. Civil, contractual, and criminal liability associated with these facilities remain with the operator even after the facilities have been transferred to the Enterprise. This provides essential certainty for operators and investors, which is crucial for accelerated carbon capture, utilization, and storage (CCUS) deployment and meeting Colorado's ambitious climate targets.

The Geologic Storage Stewardship Enterprise Cash Fund ("the Fund") is financed by an annual per-ton[2] stewardship fee on injection carbon dioxide (CO_2).[3] Based on the expected overall cost of the long-term stewardship services provided by the Enterprise and on a review of the research and analysis of fees in other states, it is recommended to set Colorado's initial fee in the $0.08-$0.12 per ton range. These recommendations strike a necessary balance, accounting for the expected overall cost of the long-term stewardship services provided by the Enterprise, the state's relatively limited scope of liability assumption compared to other states, the current landscape of lower-volume projects in the state that will still incur the same base expenses as higher volume projects, and the lack of alternative fees capitalizing the Fund.

To ensure adequate funding in perpetuity, the Enterprise board ("the Board") is advised to reevaluate the stewardship fee three years after its implementation. Following this initial cycle, the Board may choose to reevaluate after another three or five years. Subsequent reevaluation cycles should occur every five years. This approach is consistent with the Board's authority to adjust the fee as frequently as it determines necessary and balances

1Geologic Storage Enterprise & Geothermal Resources, HB25-1165, 75th Gen. Assem., 1st Reg Sess. Ch. 257. 2025. https://leg.colorado.gov/bills/hb25-1165

2"Ton" in this paper refers to metric ton, which is the unit of measurement most commonly used in carbon storage research and recognized by the federal government for Section 45Q tax credits.

3From ECMC's Class VI rules: "**INJECTION CARBON DIOXIDE** means carbon dioxide, including its derivatives and all mixtures, combinations, and phases, whether liquid, gaseous, supercritical, or solid, and whether stripped, segregated, or divided from any other Fluid stream, including all incidental associated substances derived from the source materials." Throughout this paper, "injected CO_2" will be used to indicate "injection carbon dioxide" that has been injected into a geologic storage estate for sequestration by a Class VI UIC well.

the Enterprise's need for long-term financial security with the operators' need for price predictability. State law also authorizes the Board to impose an additional orphaned geologic storage facility fee to address plugging, abandonment, reclamation, and remediation of orphaned geologic storage facilities. In order to impose this fee, the Board is required to find that 1) geologic storage operations in the state are likely to create orphaned geologic storage facilities, 2) financial assurance provided by operators will be insufficient to address orphaned geologic storage facilities, and 3) stewardship fees deposited into the Fund will be insufficient to address both long-term stewardship and orphaned geologic storage facilities. At this time, none of these criteria have been met. Therefore, it is recommended that the Board not impose an additional fee at this time.

The framework for the funding of LTS, coupled with the comprehensive site selection, monitoring, and verification standards that position geologic storage sites to be low risk at the time of site closure and transfer, provides the foundation to secure the long-term protection of public health, safety, welfare, the environment, and wildlife resources.

Introduction

Colorado has long been committed to reducing statewide greenhouse gas (GHG) emissions, as demonstrated by the passing of House Bill (HB)19-1261 and Senate Bill (SB)23-016.[4,5] These legislative actions established statewide emission reduction goals to reduce GHG emissions from 2005 levels by 26% by 2025, 50% by 2030, 65% by 2035, 75% by 2040, 90% by 2045, and to achieve net-zero emissions by 2050. The state and its industries are making progress toward the established emissions targets, but achieving net-zero emissions will require emerging strategies, including carbon capture, utilization, and storage (CCUS), to decarbonize the remaining hard-to-abate industries.

CCUS is a set of technologies and processes designed to minimize or eliminate the release of carbon dioxide (CO_2) emissions into the atmosphere, particularly from industrial sources. This is achieved by collecting CO_2 from a facility's waste stream, then either reusing it for commercial applications or transporting it to a safe geologic storage site and injecting it into underground reservoirs. Direct Air Capture (DAC) is also an important component of the CCUS strategy; unlike traditional carbon capture that targets a point source, DAC technologies

4Climate Action Plan to Reduce Pollution, HB19-1261, 72nd Gen. Assem., 1st Reg. Sess. Ch. 392. 2019. https://leg.colorado.gov/bills/hb19-1261

5Greenhouse Gas Emission Reduction Measures, SB23-016, 74th Gen. Ass., 1st Reg. Sess. Ch. 42. 2023. https://leg.colorado.gov/bills/sb23-016

remove CO_2 directly from the atmosphere.

The Polis administration launched a task force in March 2021 to advance CCUS as a key carbon abatement strategy in Colorado.[6] One key recommendation was to enable the Colorado Oil and Gas Conservation Commission (COGCC) to seek Class VI primary enforcement authority ("primacy") from the United States Environmental Protection Agency (EPA). Class VI wells inject CO_2 into deep underground formations; states have the right under the Safe Drinking Water Act to seek primacy from the EPA, meaning states rather than EPA oversee the permitting process for these wells. Moving in parallel with the task force, COGCC published a report evaluating the Requirements, Resources, Considerations, and Recommendations for the State of Colorado to Implement a Safe and Effective UIC Class VI Program. This report outlined the prerequisites for a successful Class VI primacy application and provided insights into the technical components necessary for effective regulatory oversight.

Building upon the groundwork laid in 2021, COGCC published another report in January 2023. Titled Creating Colorado's Carbon Sequestration Framework – A Legislative Proposal, this report delved into the legal challenges and changes required to establish a comprehensive regulatory framework for CCUS in Colorado. Key considerations, such as pore space ownership and environmental justice, were explored in detail.

Also in 2023, Colorado enacted a pair of laws to advance its climate goals. Senate Bill (SB)23-016 granted the state the authority to pursue Class VI primacy and formally reaffirmed Colorado's commitment to ambitious GHG reduction targets. This legislation also included protective limitations for well siting and directed COGCC to conduct this study regarding stewardship fees. Taking effect shortly thereafter, SB23-285 expanded the agency's mission, renaming the COGCC as the Energy and Carbon Management Commission (ECMC) and broadening its regulatory jurisdiction beyond traditional oil and gas activities to a wider spectrum of energy and carbon management initiatives.[7]

In 2024, ECMC released the report Carbon Capture and Storage: Safety and Impact Considerations from Source to Sequestration; this comprehensive report outlines safety considerations and potential impacts of CCUS technology. ECMC received a 1.9 million dollar

6Carbon Capture, Utilization, and Storage (CCUS) Task Force Subcommittee Recommendations. February 2022. https://www.mines.edu/carboncapture/wp-content/uploads/sites/365/2022/02/Task-Force-Recommendations-Final.pdf

7Energy and Carbon Management Regulation in Colorado, SB23-285, 74th Gen. Ass., 1st Reg. Sess. Ch. 235. 2023. https://leg.colorado.gov/bills/sb23-285

grant, authorized through the Infrastructure Investment and Jobs Act,[8] to build and support Class VI primacy efforts to be applied over a 5 year period. HB24-1346 was later enacted to address items not included in SB23-016, including pore space ownership, unitization of geologic storage, and cumulative impacts.[9] Extensive stakeholding throughout 2024 culminated in ECMC professional commission's ("the Commission") unanimous adoption of ECMC's Class VI rules in December 2024. While ECMC's Class VI rules include all the necessary federal regulations required by the EPA, the Commission also adopted rules that go above and beyond EPA requirements and are specific to Colorado, including public consultation and notification requirements, additional protections for disproportionately impacted communities, recognition of and collaboration with local governments in their siting authority and permitting processes, and a cumulative impacts analysis.

While Colorado's primary strategy for mitigating climate change is deploying clean energy generation and utilizing that clean electricity in buildings, vehicles, and industry, carbon management will play a crucial role in helping the state decarbonize and achieve its net-zero target by 2050. In 2023, the Colorado General Assembly passed HB23-1210, which mandated the creation of a Carbon Management Roadmap for the State of Colorado to be presented at the 2025 legislative session.[10] The resulting report provided recommendations on building out the necessary conditions to support and appropriately regulate the deployment of carbon management technologies, markets, and projects in Colorado. In order to promote carbon sequestration activities in the state and protect the public from potential future costs, the roadmap recommended a long-term stewardship (LTS) fund and oversight authority be established. As such, HB25-1165 created the Geologic Storage Stewardship Enterprise Cash Fund ("the Fund") for long-term oversight and stewardship of Class VI facilities, fulfilling another key recommendation of the 2021 CCUS task force.[11]

ECMC formally submitted Colorado's Class VI primacy application to EPA in late spring 2025 and has continued to advance program development while the application is under review. As of October 2025, there are two Class VI permits currently under EPA review in the

8Infrastructure Investment and Jobs Act, H.R.3684, P.L. 117-58. 429 Stat. 135, 15 November 2021. https://www.congress.gov/bill/117th-congress/house-bill/3684/text
9Energy & Carbon Management Regulation, HB24-1346, 74th Gen. Assem., 2nd Reg. Sess. Ch. 216. 2024. https://leg.colorado.gov/bills/hb24-1346
10Carbon Management, HB23-1210, 74th Gen. Assem., 1st Reg. Sess. Ch. 236. https://leg.colorado.gov/bills/hb23-1210
11Geologic Storage Enterprise & Geothermal Resources, HB25-1165, 75th Gen. Assem., 1st Reg Sess. Ch. 257. 2025. https://leg.colorado.gov/bills/hb25-1165

state and more projects in the pre-application phase. The foundation of Colorado's LTS framework is well-aligned with evolving national policy strategies, adopting a legal structure in line with the recently-released IOGCC model statute. Determination of stewardship fees is an essential next step to securing a comprehensive governance structure for geologic carbon storage in Colorado.[12]

Colorado's Geologic Storage Stewardship Enterprise

What Is Long-Term Stewardship (LTS)?

Before a Class VI project can be considered for approval by the Commission, the operator is required to provide a detailed, formal plan for site closure as part of its application; this plan may be updated multiple times in the life of a project. This plan, among others, is put into action upon cessation of CO_2 injection, which begins the post-injection site care (PISC) phase. PISC requires the operator to properly plug the well(s); monitor the CO_2 plume and pressure front; demonstrate that the project does not endanger public health, safety, welfare, the environment, wildlife resources, and underground sources of drinking water (USDWs); and restore the site to pre-operation conditions, aside from any associated facilities or monitoring equipment required for LTS. Once all site closure activities have been satisfactorily completed and all required reports have been filed by the operator, the Commission can approve site closure and the LTS phase begins.

LTS, as defined by HB25-1165, is the "monitoring and integrity maintenance of geologic storage facilities after the Commission approves a site closure, as well as any associated action necessary to protect public health, safety, welfare, the environment, or wildlife resources." In practice, the LTS phase primarily involves periodic monitoring of the site and addressing any issues that may arise. Site-specific monitoring strategies will have been developed and refined throughout the operational life of the project. These acquired data and operational strategies can be leveraged to inform and streamline monitoring protocols during LTS.

The primary risk to manage in a Class VI project is that stored CO_2 could migrate out of the injection zone. Research indicates that the likelihood of leakage is highest during the

12Interstate Oil & Gas Compact Commission: Model Statute and Guidance on Geologic Sequestration of Carbon Dioxide: A Guide for States. September 2025. https://oklahoma.gov/content/dam/ok/en/iogcc/documents/committees-councils/legal/CCSModelStatute09.24.25.pdf

latter stages of the injection period, when pressures and volumes within the reservoir are at their peak.[13] Once injection ceases, reservoir pressures gradually decline as the CO_2 continues to stabilize within the injection zone, with increasing amounts of CO_2 being immobilized through solution trapping and mineralization.[14] Eventually, formation pressures will equalize and the plume will functionally become stationary.

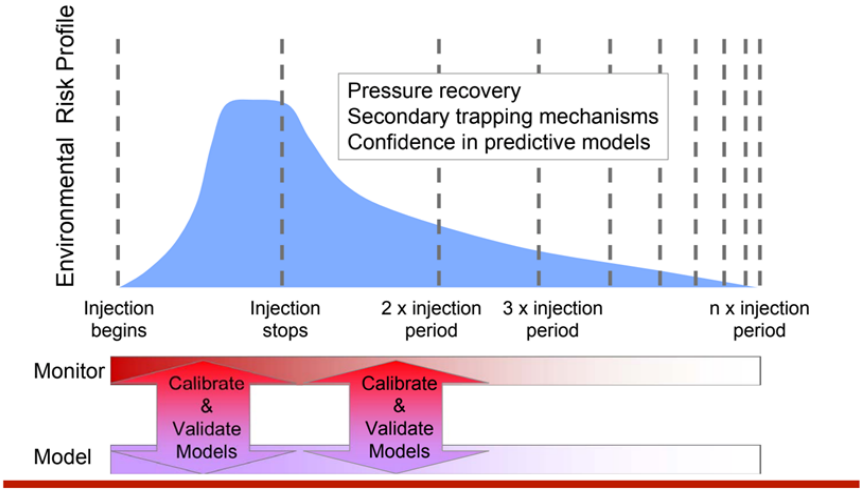

Figure 1. Risk profile curve for CCUS sites[15]

Site closure is only authorized when the plume has stabilized and there is a clear demonstration of no endangerment to USDWs. While there is not yet precedent for the five decades of plume stabilization required as the standard PISC period by Colorado law, the risks of leakage at that point have significantly decreased compared to the injection period. Despite this fact, risks can remain, making enduring LTS important to the protection of public health, safety, welfare, the environment, and wildlife resources.

The Enterprise

The necessity for continual and stable LTS after the revenue stream of a Class VI

13Handler et al. (The Payne Institute for Public Policy). Geological Storage: Risks and Operational Risk Mitigation. *Payne Institute Commentary Series*. July 2024. https://payneinstitute.mines.edu/geological-storage-risks-and-operational-risk-mitigation/

14Leslie et al. Quantification of solubility trapping in natural and engineered CO2 reservoirs. *Petroleum Geoscience*, Vol. 27, No. 4. November 2021. https://blogs.ed.ac.uk/stuartgilfillan/wp-content/uploads/sites/183/2021/10/Leslie-et-al.-2021-Quantificatiion-of-solubility-trapping-in-natural-and-engineered-CO2-reservoirs.pdf

15Benson, S. Workshop Summary: Addressing Long-Term Liability of Carbon Dioxide Capture and Geological Sequestration. World Resources Institute. 5 June 2007. https://pdf.wri.org/ccs_liability_workshop_final_060507.pdf

project has ended presents a challenge to the commercial viability of this necessary technology. HB25-1165 offers a solution to this challenge through the creation of Colorado's Geologic Storage Stewardship Enterprise ("the Enterprise"). After determination of site closure by ECMC, LTS responsibilities are transferred from the operator to the Enterprise. The transfer of LTS responsibilities to the Enterprise supports Colorado's climate goals and is in the public interest in four key ways:

1) Operators may be deterred from developing geologic storage operations in the state if they are expected to retain all liability indefinitely[16] after the revenue stream for the project ends.

2) The post-site closure transfer of ownership offers operators and investors greater certainty when planning for or supporting projects with defined timelines and liability considerations. This helps to catalyze projects in the state, supporting Colorado's climate goals.

3) There is no guarantee that operators will exist for the full lifecycle of a geologic storage project; the Enterprise offers longer-term reliability to address issues that may emerge in the future. Funds dedicated to LTS relieve state taxpayers of the potential burden of managing orphaned sites, while the Enterprise itself provides landowners with a persistent and protective contact should any issues arise.

4) Oversight by the Enterprise enables a consistent approach to managing storage sites and a commitment to protecting public health, safety, welfare, the environment, and wildlife resources.

Under Colorado law, the operator must continue to conduct monitoring as specified in the approved PISC and site closure plan for at least 50 years before being eligible to transfer ownership to the Enterprise, except under special approval conditions.[17,18] Prior to transfer,

16Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO2) Geologic Sequestration (GS) Wells, 75 Fed. Reg. 77230 (10 Dec 2010). Amending 40 C.F.R. Parts 124, 144, 145, 146, and 147. https://www.federalregister.gov/d/2010-29954/p-646

17ECMC Rule 1423.b.(1)

18There are provisions allowing an alternative PISC timeframe to be approved prior to the initial authorization to inject (ECMC Rule 1423.c), or for the UIC Director to approve a shortened PISC timeframe if evidence is presented indicating that the operations no longer pose an endangerment to public health, safety, welfare, the environment, including USDWs, or wildlife resources (ECMC Rule 1423.b.2).

all costs associated with the site and any required monitoring is the responsibility of the operator. With ECMC approval of site closure, ownership of the storage facility, injected CO_2, and any remaining monitoring equipment or facilities is transferred to the State without compensation.

Additionally, at site closure the operator is released from further regulatory liability related to the facility in most circumstances. There are situations under which regulatory liability may either remain with or be reimposed on the operator, though the latter may only occur if the Commission determines it necessary after notice and hearing. The operator retains all civil, criminal, and contractual liability even after the site has been transferred to the State. HB25-1165 affirmed governmental immunity with regard to Class VI projects, protecting the State from liability.[19]

The Enterprise is governed by a volunteer board ("the Board") that will adopt rules as necessary to implement the relevant components of HB25-1165 and set fees to fund LTS activities. The Board may increase or reduce the stewardship fee as frequently as deemed necessary and is authorized to engage the services of contractors, consultants, and the Attorney General's office to carry out business. The Board is also authorized to impose an additional fee to address plugging of orphaned geologic storage facilities if certain criteria are met (see the "Orphaned Geologic Storage Facilities" section).

Board Responsibilities and Terms

The Enterprise is administered by a board consisting of five volunteer members. HB25-1165 specifies that the members must be:

1) The chair of the ECMC professional commission ("the Chair"),
2) The director of ECMC ("the Director") or their designee,
3) An individual with experience in geologic storage,
4) An individual with formal training or experience in environmental protection or public health,
5) And an individual with formal training or experience in wellbore monitoring or

19HB25-1165 updated several laws concerning the administration of underground geothermal resources, which is outside the scope of this paper.

other relevant technical fields.

Other than the ECMC Chair and Director (or their designee), members are appointed by the Governor and confirmed by the Senate to serve three year terms, with exceptions set for the initial terms of appointed members. There is no limit on the number of terms a member can serve.

The Board has the following responsibilities:

- Administer the Enterprise.
- Within six months confirmation, set the initial stewardship fee at an amount that is reasonably related to the overall cost of the LTS services provided by the Enterprise. Any future increases or reductions to the fee should comply with this principle.
- Increasing or reducing the stewardship fee as frequently as the Board deems necessary, in order to align on: (1) the overall cost of the Enterprise's LTS services, including reasonably anticipated future expenditures from the Fund; and (2) the requirement that the Fund not exceed $100M in the first five years of the Enterprise's existence.
- Consider the importance of financial predictability for operators when determining the frequency of changes to the stewardship fee amount.
- Advise the Commission of the outcome of the Board's deliberations on any of the above matters.

To enable the above responsibilities, the Board has the following powers:

- Adopt procedures for conducting the Board's affairs.
- Acquire, hold title to, and dispose of real and personal property, including ownership of injection CO_2 upon approval of site closure of an associated geologic storage facility by the Commission.
- Hire individuals, professional consultants, and contractors that will aid in carrying out business that the Board deems necessary.

- Engage the services of contractors, consultants, and the Attorney General's Office for professional and technical assistance, advice, and to supply other services related to the conduct of the affairs of the Enterprise.

- Seek, accept, and expend gifts, grants, donations or other payments from private or public sources to be deposited into the Fund. The total amount of all grants from the Colorado state and local governments received in any State fiscal year (July through June) will be less than 10% of the Enterprise's total annual revenue for that fiscal year.

- Create and impose upon operators an additional fee to address the plugging, abandonment, reclamation, and remediation of orphaned geologic storage facilities. This additional fee is only authorized if the Board finds:

    - Geologic storage operations are likely to create orphaned geologic storage facilities in the future;

    - The financial assurance required by ECMC's Class VI rules will be insufficient to address orphaned geological storage facilities; and

    - The existing stewardship fees will be insufficient to address both LTS and orphaned geologic stewardship facilities.

- Perform all acts necessary to accomplish site closure for orphaned geologic storage facilities.

Liability

ECMC's Class VI rules require operators to engage in considerable up-front research and planning related to site selection, monitoring, and verification; these extensive pre-approval requirements seek to quantify potential risks and impacts so they can be thoroughly addressed while a project is in its planning stages. The closure of a site is planned—and that plan approved by ECMC—prior to the issuance of permits in order to minimize any risks associated with the latter stages of the project lifecycle. However, it is impossible to eliminate all risk from any project and the extent of liability established in HB25-1165 must be understood when determining the appropriate fee level.

HB25-1165 releases the geologic storage operator of regulatory liability upon ECMC's

formal approval of site closure. Regulatory liability is limited to the operator's obligation to comply with ECMC rules, permit conditions, or orders of the Commission. Regulatory liability does not include civil, contractual, or criminal liability; these forms of liability remain with the operator after site closure, subject to statutes of limitations.

Regulatory liability can remain with or be reimposed on the operator after site closure if the Commission determines, after notice and hearing, that the operator was in material violation of a state law or regulation and has not remedied that violation; the operator provided deficient or erroneous information to the Commission in order to receive a approval of site closure; contractual, civil, or criminal liability arises from the conduct of the operator; or there is fluid migration that causes or threatens to cause harm to a USDW.[20]

The liability framework established in the law is designed to provide operators with predictable timelines for their project while also minimizing risks related to the release of liability. For active projects across the nation, insurance mechanisms are emerging as an important aspect of operators' financial assurance plans, particularly to address ongoing risk and planned emergency and remedial response actions. While similar strategies could apply to the LTS phase, the Board does not need to factor potential insurance premium costs into the current fee level, as that strategy is still being investigated. Additionally, governmental immunity and statutes of limitations may provide regulators with protection from certain litigation risks.

The Geologic Storage Stewardship Enterprise Cash Fund ("the Fund")

HB25-1165 created the Fund and requires each geologic storage operator to pay a stewardship fee annually by April 30th for each ton[21] of CO_2 injected in the state during the prior year. This fee will be set within six months after the Enterprise's board is confirmed. ECMC will collect the stewardship fee on the Enterprise's behalf and may adopt rules to implement this responsibility. All money collected as stewardship fees is credited to the Fund, which is continuously appropriated to the Enterprise. The money can be used for:

1) Long-term stewardship;

2) Plugging, abandoning, reclaiming, and remediating services for orphaned

20A USDW is an aquifer or part of an aquifer that is currently used as a drinking water source, or may be utilized as a drinking water source in the future. 40 C.F.R. § 144.3

21"Ton" in this paper refers to metric ton, which is the unit of measurement most commonly used in carbon storage research and recognized by the federal government for Section 45Q tax credits.

geologic storage facilities;[22] and

3) The Enterprise's reasonable and necessary operating expenses.

The Enterprise operates as a business and its Board oversees the Fund, which is held in the state treasury. All stewardship fees are classified as fees rather than taxes. Revenue from stewardship fees is not subject to fiscal year spending limits or caps; however, the total amount of money credited or appropriated must not exceed $100M in the first five years of the Enterprise's existence.

In addition to the stewardship fee, the Enterprise can accept additional appropriations from the General Assembly, as well as gifts, grants, and donations from public or private sources to capitalize the Fund for its intended purpose. Grants from the General Assembly and/or local governments must be less than 10% of the Enterprise's total annual revenue. The State Treasurer's Office invests the Fund and distributes interest earnings, adjusted for amortization of investment premiums, discounts, and realized gains/losses, on a monthly basis.[23] All interest and income derived from the deposit and investment of money is credited back to the Fund. The Board is also authorized to issue revenue bonds if revenue streams exist to pay off the debt. Any unexpended and unencumbered money remaining in the Fund at the end of a fiscal year remains in the Fund and is not transferred to the state's General Fund or to any other fund.

What May the Funds Be Used For?

HB25-1165 specifies that the Fund may only be used to pay for the costs of (1) LTS; (2) plugging, abandonment, reclamation, and remediation services for orphaned geologic facilities at the request of the Director if the Commission, after notice and a hearing, determines that available financial assurance is insufficient; and (3) the Enterprise's reasonable and necessary operating expenses.

Long-Term Stewardship (LTS)

LTS represents the final phase of a carbon storage project, which occurs after the Enterprise assumes responsibility for the site to ensure the continued integrity of the CO_2 storage facility. Monitoring will likely be the largest ongoing cost during the LTS phase.

22The use of the Fund for orphaned GS facilities is authorized by CRS § 34-60-144(7)(d)(II). However, CRS § 34-60-144(5)(f) suggests that such expenditures are linked to an additional orphan fee imposed by the Board upon a finding that financial assurance is insufficient.
23§§ 24-36-109-113, C.R.S.

Operators employ multiple types of monitoring during the injection and post-injection phases to confirm plume behavior is in line with modeled expectations. As pressures decrease and the plume stabilizes through secondary trapping mechanisms, such intensive modeling is less critical. In the LTS phase, the state must balance the need for accurate and precise data with the associated costs. At some sites, monitoring wells paired with 4-D (time-lapse) seismic surveys have been shown to provide adequate data needed to monitor a stabilized plume.[24,25] Other, more cost-effective monitoring strategies are under development.[26,27] Site-specific monitoring plans will need to be developed for each storage site. The Enterprise will work with the operator to develop these plans, leveraging lessons learned throughout the operational phases of each project. It may be beneficial to assume ownership of monitoring wells and continue their use during the LTS phase, factoring the costs of their maintenance and eventual plugging into the overall budget.

The cost of equipment maintenance during the LTS phase is expected to be minimal. At the time the Enterprise assumes site ownership, most on-site infrastructure, including CO_2 flowlines and storage tanks and the injection well(s), will have already been decommissioned by the operator, often decades earlier. The Enterprise's obligations for equipment maintenance will center on any retained monitoring infrastructure, including monitoring wells. These wells will be subject to operational rules, which may include periodic pressure testing and groundwater sampling, as determined by the type and depth of the well and regulations set by the Division of Water Resources or ECMC.

While the operating phase poses the highest risk, some events could still occur during the LTS phase, necessitating protective actions of various magnitudes by the Board. As a financial assurance mechanism, the Board could consider securing insurance policies to cover emergency and remedial response actions. This option, however, is complicated by the current difficulty insurers have in assessing the long-term risk of CO_2 storage, which makes premium costs hard to estimate. This should be reevaluated as the geologic storage industry

24Burton-Kelly, et al. Quantifying CO_2 plume stabilization at carbon storage projects, North Dakota, USA. *International Journal of Greenhouse Gas Control*, Vol. 146. September 2025. https://www.sciencedirect.com/science/article/pii/S1750583625001549

25Burnison, S.A. et al. 4-D Seismic Monitoring of Injected CO_2 Enhances Geological Interpretation, Reservoir Simulation, and Production Operations. *Energy Procedia*, Vol. 114, pages 2748-2759. 2017. https://www.sciencedirect.com/science/article/pii/S1876610217317332

26Walker, K. et al. CO_2 Leak Detection and Conformance Verification Using Borehole Gravity. SPE Energy Transition Symposium, Houston, TX. 15 August 2023. https://doi.org/10.2118/215734-MS

27Laronga, R. and Swager, L. Time-Lapse Pulsed-Neutron Logs for Carbon Capture and Sequestration: Practical Learnings and Key Insights.

gains more widespread insurance usage.

Orphaned Geologic Storage Facilities

HB25-1165 defines an orphaned geologic storage facility as one for which an owner or operator cannot be found, or one whose owner or operator is unwilling or unable to cover the costs required to achieve site closure pursuant to ECMC rules. Existing financial assurance requirements are designed to prevent facilities from being orphaned in the first place. HB25-1165, however, declares that it is "necessary, appropriate, and in the best interest of geologic storage operators for the state to ensure that orphaned geologic storage facilities are plugged, abandoned, reclaimed, and remediated, if necessary, in a timely manner if available financial assurance is insufficient." Accordingly, the Board is authorized to perform all acts necessary to accomplish site closure for any orphaned facilities, adhering strictly to ECMC rules.

To fund this mandate, the Board is authorized to impose an additional fee on operators specifically to cover the expected costs of addressing orphaned geologic storage facilities. However, the authority to implement this additional fee is conditional. The Board must first determine that:

1) Geologic storage operations are likely to create orphaned facilities in the future;
2) The financial assurance provided by operators will be insufficient; and
3) Stewardship fees deposited into the Fund will be insufficient to cover both LTS and the costs of the orphaned facilities.

If these conditions are met, the fee subsequently imposed will be an amount reasonably related to the expected costs.

Operating Expenses

The Board is authorized to use Enterprise funds for reasonable and necessary operating expenses, which are separate from expenses related to ECMC's administration of the Class VI regulatory program. Operating expenses encompass compensation for Board members' expenses on a per-diem basis, as well as securing services from contractors, consultants, and the Attorney General's office. Crucially, the operating expenses allow for the employment of technical experts to provide specialized assistance, advice, and services outside of routine LTS activities. For instance, these funds could cover technical assistance in deploying site-

specific monitoring strategies to ensure proper tracking of the stored CO_2. While the funds may cover ancillary costs like office space or administrative staff, these are typically defrayed by ECMC.

What May the Funds Not Be Used For?

The stewardship fee is not intended to replace financial assurance obligations that the operators must hold prior to site closure. The law also prohibits funds from being used to cover administrative costs related to ECMC's oversight of the Class VI injection well permitting process. This includes costs associated with processing and reviewing permit applications for new storage sites, and ongoing administrative costs of running the Class VI program. Furthermore, the Fund is not authorized to pay salaries or service compensation to the Enterprise board members, limiting its use to per-diem expenses incurred while carrying out their required duties. The legislative intent is to reserve the Fund strictly for LTS activities.

Comparative Fee Analysis

Literature Review: Methodologies for Fee Calculation

Oil and gas operators have used injected CO_2 for enhanced oil recovery for many decades, providing valuable technical insights on the nature of injected CO_2 that can be applied to geologic storage projects.[28] Nonetheless, there is still uncertainty regarding the probability of leakage events over the long timeframes of a geologic storage project. For the purpose of financial assurance estimations, Monte Carlo analyses[29] have been employed by researchers to estimate the probability and cost of leakage events across a storage project's lifecycle. The outcomes of these analyses can serve as useful references for the Board as it evaluates the appropriate level of stewardship fees.

One such example involves the Archer Daniels Midland Illinois Basin Project in Decatur, Illinois. The project provides a useful data point for evaluation due to its status as one of the nation's first large-scale geologic storage projects, with the study focusing on financial

28National Energy Technology Laboratory. Carbon Dioxide Enhanced Oil Recovery: Untapped Domestic Energy Supply and Long Term Carbon Storage Solution. 2010. https://www.netl.doe.gov/sites/default/files/netl-file/CO2_EOR_Primer.pdf

29Monte Carlo analysis quantifies the combined effect of uncertainties in multiple input variables by running repeated model simulations, where each run uses random draws from the input variables' probability distributions. This methodology provides a quantitative estimate of uncertainty and helps identify which inputs have the greatest impact on the outcome.

assurance cost estimates for its three injection wells.[30,31] The analysis identified 13 risks over the 15-year operational phase and 10-year post operational phase, using detailed geologic and hydrologic data to estimate both the probability of occurrence and the cost of remediation. The expected risk-weighted value for the two phases was $5.5 million, or $0.14/ton. Because pipeline-related events, which account for 44% of the risk-weighted costs, are eliminated during the LTS phase, there would be justification to set a stewardship fee well below the project's probability-weighted annual cost in this example.

Another example is a 2012 study that assessed the potential risks and financial consequences of CCUS using modeling based on the proposed FutureGen 1.0 project site in Jewett, Texas.[32,33,34] The analysis relied on publicly available risk assessment data and employed Monte Carlo modeling to estimate potential economic damages at a well-sited and managed CCUS project. Financial impacts included potential costs for compensation, remediation, and an atmospheric release that would require the purchase of carbon offset credits. The model considered a 100-year timeframe that included 50 years of injection operations and 50 years of post-injection monitoring. Results estimated the "most likely" (50th percentile) damages of $0.15/ton, and the "upper end" (95th percentile) damages of $0.34/ton. There was a 99% probability that damages would remain at or below $0.50/ton over the full analysis period. These results include the injection period, during which risk has been shown to peak. Potential releases at legacy well locations in the sequestration site area had probabilities that were orders of magnitude higher than any other type of release event at the site, and were responsible for over 95% of modeled total damages. This may not be the situation at every future site, as the density of legacy wellbores and the quality of past and current remediation jobs of those wellbores will vary from location to location. Adequate remediation of legacy wellbores, as is required under ECMC rules, could lessen this

30EPA. ADM CCS #5-7 Financial Responsibility Plan. April 2023. https://www.epa.gov/system/files/documents/2023-07/ADM_Maroa_Cost_Estimates.pdf

31Handler et al. (The Payne Institute for Public Policy) Locked Up for the Long Term: Risk Mitigation and Liability Assumption in the Geological Storage of CO_2. *Payne Institute Commentary Series*. 5 August 2024. https://payneinstitute.mines.edu/locked-up-for-the-long-term-risk-mitigation-and-liability-assumption-in-the-geological-storage-of-co2/

32Trabucchi, C. et al. (Industrial Economics, Incorporated). Valuation of Potential Risks Arising from a Model, Commercial-Scale CCS Project Site. Global CCS Institute. 2012.

33Donlan, M. and Trubucchi, C. Valuation of Consequences Arising from CO2 Migration at Candidate CCS Sites in the U.S. *Energy Procedia*, Vol. 4., pages 2222-2229. 2011. https://www.sciencedirect.com/science/article/pii/S1876610211003079

34Havercroft, I. 2019 Thought Leadership: Lessons and Perceptions: Adopting a Commercial Approach to CCS Liability. Global CCS Institute. 2019. https://cdrlaw.org/wp-content/uploads/2020/10/Thought-Leadership-Liability-Study_FINAL_Digital.pdf

probability.

These studies effectively demonstrate that financial liability estimates and associated probability distributions can be developed for geologic storage projects. Properly designed and operated projects carry a relatively low risk of significant damages. It's difficult to overstate the impact of proper site selection on the probability of leakage events and resulting cost outcomes at each project; when remediation costs are large but rare, the probability-weighted dollar amount can be small relative to total tons injected. As a result, risk-weighted values of $0.14-$0.15 per ton during the operational and post-operational phases could justify a stewardship fee set below these levels for Class VI sites that are well-sited and well-managed.

Fees in Established Primacy States

Some states have enacted legislation allowing them to assume long-term liability for a CO_2 storage project after a period of post-injection monitoring, provided the operator meets all state-defined conditions. This liability transfer period varies, ranging from a minimum of 10 years after injection ceases (Indiana, Louisiana, and North Dakota) to 20 to 30 years after injection ceases (Wyoming and Montana, respectively). To qualify for this transfer, the operator must confirm they have met all permit requirements and demonstrated the stability of the injected CO_2 plume. While the EPA recommends a 50-year PISC period, it allows operators to apply for an alternative timeframe; Colorado has adopted this policy. The three states discussed in this section with Class VI primacy have also established a trust fund or special revenue account, financed by operator fees (typically on a per-ton of CO_2 injected basis), to cover any costs related to this assumption of long-term liability and stewardship responsibilities. The Appendix outlines the fee structures and liability approaches adopted by all other states that have enacted such legislation.[35,36]

North Dakota

North Dakota was the first state to be granted primacy for Class VI wells on April 24,

35Handler et al. (The Payne Institute for Public Policy). Long-Term Stewardship: Releasing Residual Liability. *Payne Institute Commentary Series*. July 2024. https://payneinstitute.mines.edu/long-term-stewardship-releasing-residual-liability/

36Jacobs, W.B. and Stump, D.L. (Harvard Law School, Emmett Environmental Law & Policy Clinic) Proposed Liability Framework for Geological Sequestration of Carbon Dioxide. November 2010. https://clinics.law.harvard.edu/environment/files/2019/09/proposed-liability-framework-geological-sequestration-carbon-dioxide.pdf

2018. The state established both a Carbon Dioxide Storage Administrative Fund[37] ("the ND Administrative Fund") which covers expenses during the construction, operational, and preclosure phases, and a Carbon Dioxide Storage Facility Trust Fund[38] ("the ND Trust Fund") which covers post-closure activities only. The ND Trust Fund is the financial mechanism most comparable to Colorado's Geologic Storage Stewardship Fund, as the ND Administrative Fund covers activities up to and including site closure.

The ND Administrative Fund is used to defray the North Dakota Industrial Commission's (NDIC) expenses in permitting, regulation, and storage determination, or to compensate other state agencies for expenses incurred in carrying out regulatory responsibilities related to Class VI projects. Funding for the ND Administrative Fund comes from an operator fee of $0.01/ton of injected CO_2, along with permitting fees and an ongoing legislative appropriation equivalent to the cost of 2 FTEs. The fee was originally calculated based on the cost of employing one full-time field inspector.

The ND Trust Fund charges operators $0.07/ton of injected CO_2. Its purpose is to defray the NDIC's expenses for long-term monitoring and management of a closed storage facility, or to compensate another state agency for relevant regulatory expenses. As the first state to establish such stewardship fees, North Dakota calculated the $0.07 rate by applying lessons from large industrial cleanup efforts to the carbon capture industry. Specifically, they determined the figure by summing the remediation costs for the state's two largest industrial spills (a produced water brine spill[39] and a long-term diesel leakage resulting in a subsurface plume[40]) and comparing that total to the estimated capturable CO_2 volume from the state's coal-fired power plants.

Operators are subject to a minimum of 10 years of PISC before they are eligible to apply for formal site closure. The state will only assume ownership for the storage facility if the operator successfully demonstrates plume stability and meets all other requirements.[41]

37 N.D.C.C. § 38-22-14
38 N.D.C.C. § 38-22-15
39 Cody VanderBusch. Charbonneau Creek Salt Water Spill. North Dakota Department of Mineral Resources Newsletter. January 2012. https://www.dmr.nd.gov/ndgs/documents/newsletter/2012January/CharbonneauCreekSaltWaterSpill.pdf
40 City of Mandan. Mandan Diesel Fuel Remediation Project. 22 January 2020. https://www.cityofmandan.com/vertical/sites/%7B38C3EFDC-F4D8-4D02-9E13-0987A081A7A4%7D/uploads/Mandan_Remediation_Trust_Presentation_01_22_20.pdf
41 N.D.C.C. § 38-22-17

Criminal, civil, and contractual liability remains with the operator. The standard per-ton injection fees apply by default to CO_2 produced and injected within North Dakota, though operators can request a hearing for an adjusted fee amount. If CO_2 is transported from out-of-state for injection in North Dakota, a mandatory hearing will be held to determine the fees based on potential impact to the state's energy and agriculture production economy. Fees contributing to the ND Trust Fund are formally reevaluated every four years through a letter to the state legislature, to ensure the fund resources are sufficient to satisfy the fund's objectives. The 2026 report is anticipated to provide the state's first multi-year analysis of deposits generated by several active facilities.

Wyoming

On September 3, 2020, Wyoming became the second state to be granted primacy for Class VI wells. To manage the associated LTS responsibilities, the state established the Geologic Sequestration Special Revenue Account ("the WY Special Revenue Account").[42] This fund is designed to cover a comprehensive set of future costs: testing, monitoring, and long-term inspections; remediation of mechanical problems with remaining wells and infrastructure; the plugging and abandonment of monitoring wells; and the resolution of all future claims related to CO_2 release after a project completion certificate is issued, financial assurance is released, and the injection permit is terminated.

The fee is set at $0.07/ton of injected CO_2.[43] Following the precedent of North Dakota, it represents remediation costs for potential hazardous waste incidents. Operators become eligible to apply for a certificate of completion 20 years after CO_2 injection ceases if they meet all the requirements for site closure, which include demonstrating plume stability and the mechanical integrity of all wells and facilities.[44] Prior to closing the site, operators must conduct a final cost estimate for long-term monitoring; if their contributions to the WY Special Revenue Account haven't reached that estimated total, they're required to pay the difference. Only after these conditions are met, the permit is terminated, financial assurance is released, and a Certificate of Project Completion is issued, can the operator successfully transfer the title, liability, and long-term stewardship responsibilities for the sequestered CO_2 to the state.

42 W.S. § 35-11-320
43 Wyoming Water Quality Rules Ch. 29
44 W.S. § 35-11-319(d)(i)

Louisiana

Louisiana was the third state to be granted primacy for Class VI wells on February 5, 2024 and represents over one-third of all pending applications nationwide as of the time of this report. To manage LTS of geologic storage facilities, the state established the Carbon Dioxide Geologic Storage Trust Fund,[45] which is funded through a combination of per-ton injection fees, application fees, annual regulatory fees, and area of review filing fees. The fund covers purposes outside of LTS: it is used for administration of the Class VI program, remediation and repair work, and the payment of fees related to acquisition of future liability insurance.

The per-ton injection fee varies by storage facility and is determined by the Department of Conservation and Energy. This injection fee amounts to roughly $35k per facility per month over a 12 year period. Other fees apply as stated above. An operator's total contribution of all stated fees is capped at $5 million per facility or $10 million per operator. Fee collection may resume if the respective fund balances fall below $4 million per facility or $8 million per operator. The fee is subject to annual reevaluation based on the estimated costs for administration and enforcement, divided by the projected tonnage of CO_2 injection for the upcoming year.

Provided operators demonstrate the long-term safety and integrity of the site, operators become eligible for a Certificate of Completion of Injection Operations 50 years after injection ceases.[46] Alternative timeframes may also be approved, pursuant to rule, as part of the operator's PISC plan. Upon issuance of this certificate, ownership of the facility and the stored CO_2 officially transfers to the state, releasing the operator of LTS responsibilities and liabilities. The state's assumption of liability for any future claims related to the stored CO_2 is capped at the existing balance within the Carbon Dioxide Geologic Storage Trust Fund. The agency secretary is required to submit a comprehensive report to the state legislature every five years to assess the effectiveness of the fund.

Analysis of Possible Stewardship Fees in Colorado

To estimate the fee level necessary to fund LTS in Colorado, the potential revenue for the Fund can be projected based on a range of possible stewardship fees applied to various sizes of CCUS projects. Table 1 illustrates the calculated revenue generated for the Fund

45 L.R.S. § 30:1110
46 L.R.S. § 30:1109.A.(1)

across a range of potential fee levels and project scales. The low end of the fee range is set by the fee amounts in Wyoming, North Dakota, and Nebraska, while the high end is derived from West Virginia (See Appendix). Although these state-to-state comparisons are imperfect due to differences in assumed liability and other collected fees, this range provides a basis for estimating revenue for potential projects in Colorado. A 12-year operational timeline is used in this calculation as it represents the number of years for which an eligible Class VI project can claim the full federal Section 45Q tax credits, although many projects have planned injection timeframes that are much longer.

The annual injection rate of CO_2 defines a project's scale, and the injection volumes in the table represent the midpoint of each category. While there is no industry consensus for these ranges, small-scale projects (up to 100,000 tons per year) are typically research and development pilot projects, while large-scale projects (greater than 1,000,000 tons per year) represent sustained commercial operations connected to large power plants or industrial facilities.[47,48] The Denova Class VI project in Washington County, which plans to inject up to 350,000 metric tons per year of CO_2 from two nearby ethanol plants, would be considered medium in scale relative to projects nationwide.[49]

For this analysis, data from the Colorado Department of Public Health and Environment's (CDPHE) Greenhouse Gas Emissions and Energy Management (GEMM) program[50] may also be incorporated to provide a general overview.[51] The GEMM Data Explorer provides GHG emissions data for all Colorado facilities regulated under the Air Quality Control Commission Regulation 27. Of these facilities, 13 emitted less than 100,000 metric tons of CO_2 equivalent, 9 emitted between 100,000 and 1,000,000 tons, and none exceeded 1,000,000

47Department of Energy. Supporting Information for DOE Notice of Proposed Rulemaking: Experience from Geologic CO2 Storage Field Projects Supported by DOE's Sequestration Program. 2010. https://www.energy.gov/nepa/articles/geologic-carbon-dioxide-storage-field-projects-supported-does-sequestration-program

48Groundwater Protection Council. An Assessment of State Needs for Regulating Geologic Sequestration of Carbon Dioxide. January 2011. https://www.gwpc.org/wp-content/uploads/2022/12/CO2_Needs_Assessment_Report_Final_1_31_2011.pdf

49Carbon America. Carbon Capture Magazine. Carbon America Submits First Class VI CO_2 Injection Well Permit to EPA Region 8. 23 January 2024. https://carboncapturemagazine.com/articles/carbon-america-submits-first-class-vi-co2-injection-well-permit-to-epa-region-8 (Accessed 16 October 2025)

50Colorado Department of Public Health & Environment. Greenhouse Gas Emissions and Energy Management for Manufacturing 2 (GEMM 2) Rule, as approved by the Air Quality Control Commission. n.d. https://cdphe.colorado.gov/apcd/GEMM-phase-2-rule (Accessed 27 October 2025)

51The GEMM Data Explorer may not fully represent the amount of emissions capable of being sequestered for a given project. Clarification may be sought from CDPHE on a per-project basis.

tons. Even considering the combination of emissions from multiple facilities into a single Class VI well, as is seen with the Denova project, these figures reasonably suggest that most Class VI projects in Colorado would be classified as small to medium-scale.

Table 1

Project scale	Timeframe	Planned maximum injection volume	Stewardship fees ($/metric ton)		
			$0.07/ton	$0.10/ton	$0.13/ton
Small-scale (0-100,000 tons/year)	Per year	50,000 tons	$3,500	$5,000	$6,500
	Per 12 years	600,000 tons	$42,000	$60,000	$78,000
Medium-scale (100,000-1,000,000 tons/year)	Per year	550,000 tons	$38,500	$55,000	$71,500
	Per 12 years	6,600,000 tons	$462,000	$660,000	$858,000
Large-scale (>1,000,000 tons/year)	Per year	3,000,000 tons	$210,000	$300,000	$390,000
	Per 12 years	36,000,000 tons	$2,520,000	$3,600,000	$4,680,000

Fee Considerations

Enterprise Fees in Colorado

Unlike the other states discussed in this paper, Colorado's constitution includes the Taxpayer's Bill of Rights[52] (commonly called "TABOR"). TABOR is essentially a tax revenue and spending limit for the state and local governments. However, a fee collected by an enterprise, such as the Geologic Storage Stewardship Enterprise, is not considered a tax and thus not subject to TABOR tax revenue and spending limits *so long as* the fee continues to qualify as a fee.

To qualify as a fee, and thus be exempt from TABOR limits, the Board must set a stewardship fee which:

52 Colo. Const. art. X, § 20

1. Complies with the statute which authorizes the fee;

2. Is reasonably related to the overall cost of the service(s) provided by the Enterprise to the fee payers (mathematical precision is not required, but the fee amount cannot be arbitrary or excessive); and

3. Does not generate more than $100 million in fees and surcharges within the first five fiscal years of the Enterprise's existence without voter approval.

Fee Reevaluation

With long-term carbon sequestration in its nascency, it's reasonable to expect the stewardship fee will need to be reevaluated over time as risks are better understood, monitoring technologies evolve, and cost projections change. The Board is charged with setting the stewardship fee amount at a level that is reasonably related to the total cost of providing LTS services. While the Board has the flexibility to increase or reduce the fee as frequently as necessary, it must balance this adaptive management with the operators' critical need for cost predictability. Furthermore, to provide initial fiscal guardrails, TABOR and HB25-1165 limit the total amount of money collected in the Fund to not exceed $100 million during the first five years of the Enterprise's operation. Initial Class VI projects are not anticipated to generate revenues approaching this stipulated maximum.

Given the fact that LTS will commence decades after initial injection, inflation will be a factor influencing future costs of goods and services. Returns generated from the investment of assets within the Fund are expected to grow and could offset standard inflationary impacts. While the Board is not authorized to incorporate automatic inflationary factors into the per-ton injection fee (unlike Alaska's regulatory program, which adjusts its annual fee based on the Consumer Price Index for urban Alaska[53]), inflation may significantly influence the Board's decision when manually adjusting the fee level.

The Board should periodically compare the total funds in the account with the projected total costs of LTS activities across all projects in the state. An initial reevaluation of the stewardship fee is advised three years after implementation, with the Board choosing the next interval at three or five years. The reevaluation cycle will then be every five years thereafter. This balances the need for long-term financial security with the operators' need for price predictability. This proactive approach is fundamental to guaranteeing the long-term

53A.S. § 41.06.175

solvency of the Fund.

Post-Closure Risks

The LTS phase involves managing residual risks for potentially hundreds or thousands of years. While it's not impossible that a significant leakage pathway would be identified after site closure, it is highly unlikely. Site characterization work, decades of ongoing operational data, and continuous improvement to the subsurface computational model throughout the life of the project will result in an abundance of data and a high level of confidence in the integrity of a storage facility for any facility capable of meeting the requirements of site closure within ECMC's Class VI regulations.

Leakage concerns are primarily associated with unforeseen issues in well integrity, particularly through legacy wellbores that penetrate the confining layers, or slow migration through unmapped transmissive faults or fractures.[54,55] Such migration could potentially endanger USDWs or impact mineral or sequestration estates. Though the costs for addressing catastrophic events (i.e., acts of God) that may affect a geologic storage facility are beyond the scope of this paper, the inherent natural risks are acknowledged.

The primary regulatory focus is financial stability: the State has a vested interest in ensuring the Fund is adequately capitalized to pay for continued monitoring, maintenance, and any necessary remedial actions long after the operator's regulatory liability has been released. Securing adequate, long-term funding is the critical final mechanism for ensuring the Enterprise can safely steward these sites.

Recommendations

Stewardship Fee Recommendations

The Board should consider establishing the stewardship fee in the $0.08-$0.12 per ton range, an amount that is supported by risk-weighted probability simulations as appropriate for covering LTS costs. This recommendation places the fee slightly higher than the minimum seen in some other states to account for Colorado's lack of other flexible fee mechanisms. While other states may charge a lower per-ton fee (e.g., $0.07/ton), they utilize supplementary funding mechanisms. For example, North Dakota imposes higher fees on out-

54Ide, S.T. et al. CO2 leakage through existing wells: current technology and regulations. Energy Procedia, Vol. 1, Iss. 1, pages 3235-3242. 2009. https://sequestration.mit.edu/pdf/GHGT8_Ide.pdf
55Trabucchi, C. et al, 2012

of-state CO_2 sources, whereas Louisiana commingles their trust fund such that fees collected during the operational period can also be used for LTS; these options are disallowed under Colorado law. While the distribution of risks may vary by project, the Fund also acts as a form of risk pooling, allowing the fee to be set at a level that addresses average risk across all projects in the state.

A higher fee is also supported by the scale of the initial projects in the state. The two projects in the application phase currently have relatively low total planned injection volumes relative to other projects nationwide. Since certain essential costs, such as basic monitoring, are fixed regardless of project size, a more robust per-ton fee is necessary to adequately capitalize the Fund given the current projected volumes.

Despite the need for a higher base rate, the fee does not need to align with the higher rates adopted by some states that accept a broader range of liability. Colorado's financial exposure is protected from certain litigation risks through governmental immunity, statutes of limitation, and the ability to reimpose regulatory liability on the operator under certain circumstances. Adopting the $0.08-$0.12 range is therefore a fiscally prudent measure that ensures the Fund's self-sufficiency and long-term viability, effectively balancing limited state liability with dedicated capital.

Orphaned Geologic Storage Facility Fee Recommendations

Staff recommends that the Board refrain from setting an orphaned geologic storage facility fee at this time. While the legislature mandated a per-ton injected stewardship fee in HB25-1165, the imposition of an orphaned facility fee is discretionary. The law grants the Board authority to implement this additional fee to address plugging of orphaned geologic storage facilities as a safeguard if certain criteria are met, as described previously. As none of these criteria have been met, it is premature for the Board to establish an orphaned geologic storage facility fee.

Fee Reevaluation Recommendations

To ensure the Fund remains sufficient for the long-term stewardship of geologic storage sites, the stewardship fee should be reevaluated three years after its implementation. Following this initial cycle, the Board may choose to reevaluate after another three or five years. Subsequent reevaluation cycles should occur every five years. This cadence generally aligns with the approach taken by other states with per-ton injection fees. When considering

any fee change, the Board must carefully weigh the operators' critical need for price predictability. While a simple fee increase or reduction does not necessitate rulemaking, a modification of the fee structure would.

Conclusion

Colorado's existing regulatory framework lays the groundwork for comprehensive permitting, siting, financial assurance, and monitoring, ensuring that Class VI projects are low-risk at the time of site closure. Building on this foundation, the recommended stewardship fee range of $0.08-$0.12 per ton is a calculated baseline that accounts for the expected overall cost of the long-term stewardship services provided by the Enterprise.

This fee establishes a clear pathway for the transfer of long-term regulatory liability and stewardship responsibilities, granting operators the certainty needed to invest, while assuring communities that long-term care of the site is secured. This mechanism is crucial for catalyzing geologic carbon storage and advancing Colorado's clean energy goals. The recommended fee amount, coupled with a strategic three-year then five-year reevaluation cadence and the dedicated investment of its revenue, establishes the necessary financial and operational guardrails for the Enterprise. Separately, the decision to postpone the orphaned geologic storage facility fee ensures the Board retains the flexibility to impose that secondary safeguard only if the statutory criteria are met, helping to ensure the long-term integrity and security of geologic storage sites in Colorado.

Appendix: State-by-State Summary of Long-Term Stewardship Fees

This appendix provides a state-by-state summary of long-term stewardship fees established for post-closure monitoring, maintenance, and potential remediation of geologic carbon sequestration sites. This summary does not include information on administrative fees, permit application fees, or funds designated for general regulatory oversight.

Alabama

Name of Fund

Underground Carbon Dioxide Storage Facility Trust Fund

Fee

$0.04 per metric ton of CO_2 injected

Uses

1) Testing, monitoring, and long-term inspection of underground carbon dioxide storage facilities;
2) Remediation of mechanical problems associated with remaining wells and infrastructure;
3) Plugging and abandoning monitoring wells;
4) All costs associated with the release of carbon dioxide from underground carbon dioxide storage facilities following the issuance by the board of a certificate of project closure and completion and release of financial assurance instruments;
5) Other operations and activities deemed necessary by the board or the State Oil and Gas Supervisor to protect underground sources of drinking water and for public health and safety following the issuance of a certificate of project closure and completion by the board and release of all financial assurance instruments.

Alaska

Name of Fund

Carbon Storage Closure Trust Fund

Fee

Varies - The per ton fee is calculated as "S = (7,500,000 x (I/261.78)) / 12," where S is the dollar amount of the annual surcharge for a storage facility, and I is the Consumer Price Index for urban consumers for urban Alaska.

Uses

1) Protecting the public interest in maintaining and closing carbon storage facilities in the state;
2) Conducting long-term monitoring and maintenance of a storage facility under AS 41.06.305;
3) Prevent waste, protect correlative rights, and ensure public health and safety.

Arkansas

Name of Fund

Carbon Dioxide Storage Fund

Fee

$0.07 per metric ton of CO_2 injected

Uses

1) The testing, monitoring, and long-term inspection of underground carbon dioxide storage wells;
2) Expenses incurred to remediate post-closure emergencies;
3) The plugging of leaking wells;
4) Other remedial response activities associated with the carbon dioxide storage facility.

Comments

An additional $0.03 per metric ton of CO_2 injected is collected for the Oil and Gas Commission

Fund.

Illinois

Name of Fund

Carbon Dioxide Sequestration Long-Term Trust Fund

Fee

$0.31- $0.62 per metric ton of CO_2 injected

Uses

1) Take any remedial or corrective action necessary to protect human health and the environment from releases, or threatened releases, from a sequestration facility;
2) Monitor, inspect, or take other action if the sequestration operator abandons a sequestration facility or injection site, or fails to maintain its obligations under this Act;
3) Compensate any person suffering any damages or losses to a person or property caused by a release from a sequestration facility or carbon dioxide pipeline who is not otherwise compensated from the sequestration operator; or
4) Any other applicable costs under the Act.

Comments

If the sequestration operator does not possess a project labor agreement, the sequestration operator shall be assessed a per-ton sequestration fee of $0.62, if the sequestration operator does possess a project labor agreement, the sequestration operator shall be assessed a per-ton sequestration fee of $0.31.

The fee assessed to the sequestration operator under subsection (b) shall be reduced to $0.31 for every ton of carbon dioxide injected into a sequestration facility in that fiscal year if the sequestration operator successfully demonstrates to the Department that the following types of construction and maintenance were conducted in the State during that fiscal year by the sequestration operator and were performed by contractors and subcontractors signatory to a project labor agreement used by the building and construction trades council with relevant

geographic jurisdiction:

1) construction and maintenance of equipment associated with the capture of carbon dioxide, including, but not limited to, all clearing, site preparation, concrete, equipment, and appurtenance installation;

2) construction and maintenance of carbon dioxide pipelines used to transport carbon dioxide streams to the sequestration facility, including, but not limited to, all clearing, site preparation, and site remediation. For purposes of this paragraph (2), a national multi-craft project labor agreement governing pipeline construction and maintenance used in the performance of the work described in this subsection shall satisfy the project labor agreement requirement;

3) construction and maintenance of compressor stations used to assist in the transport of carbon dioxide streams via carbon dioxide pipeline, including, but not limited to, all clearing, site preparation, concrete, equipment, and appurtenance installation; and

4) construction of carbon dioxide injection wells used at the sequestration facility, including, but not limited to, all clearing, site preparation, drilling, distribution piping, concrete, equipment, and appurtenance installation.

Indiana

Name of Fund

Carbon Dioxide Storage Facility Trust Fund

Fee

$0.08 per metric ton of CO_2 injected

Uses

To defray the costs incurred by the department for the long term monitoring and management of a carbon sequestration project.

Kansas

Name of Fund

Carbon Dioxide Injection Well and Underground Storage Fund

Fee

$0.05 per metric ton of CO_2 injected

Uses

1) All activities related to permitting activities, including, but not limited to, development and issuance of permits, compliance monitoring, inspections, well closures, underground storage closure, long-term monitoring and enforcement actions;
2) review and witnessing of test procedures;
3) review and witnessing of routine workover or repair procedures;
4) investigation of violations, complaints, pollution and events affecting public health;
5) design and review of remedial action plans;
6) contracting for services needed to supplement the commission's staff expertise in facility investigations;
7) consultation needed concerning remedial action at a permitted facility;
8) mitigation of adverse environmental impacts;
9) emergency or long-term remedial activities;
10) legal costs, including expert witnesses, incurred in administration of the provisions of K.S.A. 2024 Supp. 55-1637 through 55-1640, and amendments thereto; and
11) costs of program administration.

Comments

Provides programmatic funding during sequestration and will also fund site stewardship after site closure.

Louisiana

Name of Fund

Carbon Dioxide Geologic Storage Trust Fund

Fee

Varies - The per ton fee is calculated as "five million dollars divided by one hundred forty-four divided by the total tonnage of carbon dioxide to be injected, (($5,000,000/144)/ total injection tonnage of carbon dioxide)." There are additional fees for applications and annual fees. An operator's total contribution of all fees is capped at $5 million per facility or $10 million per operator. Fee collection may resume if the respective fund balances fall below $4 million per facility or $8 million per operator.

Uses

1) Operational and long-term inspecting, testing, and monitoring of the site, including remaining surface facilities and wells;
2) Remediation associated with, arising from, or related to the site, including remediation of property and of any mechanical problems associated with remaining wells and site infrastructure;
3) Repairing mechanical leaks at the site;
4) Plugging and abandoning remaining wells or conversion for use as observation wells;
5) Administration of this Chapter;
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 appropriate insurance for future storage facility liability if it should become available, either commercially or through government funding.

Comments

Provides programmatic funding during sequestration and will also fund site stewardship after site closure.

Michigan

Name of Funds

Carbon Sequestration Fund and Long Term Remediation Fund

Fee

The fee is based on Michigan Environment, Great Lakes, and Energy's anticipated reasonable expenses associated with long-term monitoring and management of the carbon sequestration project after issuing a certificate of project completion. The fee is not to exceed 32 cents per ton of carbon dioxide stream injected. The State Treasurer will adjust this maximum amount annually by the inflation rate.

The fee is split into several funds including 10% to the Long Term Remediation Fund and 60% to the Carbon Sequestration Fund.

Uses

Carbon Sequestration Fund:

To cover the Division's expenses for long term monitoring and management of a closed carbon sequestration project after issuance of a certificate of project completion, and to cover costs associated with regulatory responsibilities with respect to a carbon sequestration project that were not paid for through any other fees.

Long Term Remediation Fund:

For remediation of carbon dioxide leakage from a carbon sequestration project after a certificate of project completion was issued for the project.

Other Funds:

The per-ton fee is also remitted to the following funds:

- 10% to the Community Benefits Fund, which is used for grants to landowners whose property is above or within ½ mile of the storage reservoir to mitigate potential adverse impacts from a carbon sequestration project
- 10% to the First Responders Fund, which provides grants to various state and local entities for emergency preparedness training, equipment, and response costs, particularly those involving carbon sequestration projects and CO_2 pipeline releases
- 10% to the Michigan Nongame Fish and Wildlife Trust Fund, which is dedicated to the

management, protection, and restoration of Michigan's nongame fish, wildlife, and native habitats

Montana

Name of Fund

Geologic Storage Reservoir Program Account

Fee

Project specific

Uses

To be used by the board for monitoring and managing geologic storage reservoirs.

Comments

If a geologic storage operator chooses to indefinitely accept liability pursuant to 82-11-183(9)(a), the board shall remit the fee to the operator. If a geologic storage operator is required to maintain liability pursuant to 82-11-183(9)(b), the board may not remit the fee.

Nebraska

Name of Fund

Carbon Dioxide Storage Facility Trust Fund

Fee

$0.07 per metric ton of CO_2 injected

Uses

1) Defraying expenses the commission incurs in long-term monitoring and management of a closed storage facility;
2) Through a cooperative or interlocal cooperation agreement with another state agency, may use the fund to compensate the cooperating agency for expenses the cooperating

agency incurs in carrying out regulatory responsibilities such agency may have over a storage facility.

North Dakota

Name of Fund

Carbon Dioxide Storage Facility Trust Fund

Fee

$0.07 per metric ton of CO_2 injected

Uses

1) For defraying expenses the commission incurs in long-term monitoring and management of a closed storage facility;
2) Through a cooperative agreement with another state agency, may use the fund to compensate the cooperating agency for expenses the cooperating agency incurs in carrying out regulatory responsibilities that agency may have over a storage facility

Comments

The standard per-ton injection fees apply by default to CO_2 produced within North Dakota. If CO_2 is transported from out-of-state for injection in North Dakota, a mandatory hearing will be held to determine the fees based on potential impact to the state's energy and agriculture production economy.

Oklahoma

Name of Fund

Class VI Carbon Sequestration Storage Facility Revolving Fund

Fee

Varies - The per-ton fee is redetermined each year based on the estimated cost of administering and enforcing the provisions of this act for the upcoming year, divided by the tonnage of carbon dioxide expected to be injected during the upcoming year.One-time

deposit

Uses

1) Remediate any issues associated with, arising from, or related to the site, including remediation of property, site infrastructure, and any mechanical problems associated with the remaining wells;
2) Fund research and development in connection with carbon sequestration technologies and methods;
3) Monitor any remaining surface facilities and wells;
4) Repair any mechanical leaks at the storage facility;
5) Hire outside legal counsel as needed to effectuate the provisions of this act;
6) Plug remaining injection wells, except for those wells to be used as observation wells; and
7) Contract for assistance with permit or application review.

Comments

Fund will not exceed $5,000,000 for a given facility. Fund will not exceed $10,000,000 per operator.

Pennsylvania

Name of Fund

Carbon Dioxide Storage Facility Fund

Fee

Fee to be set

Uses

Defraying the costs associated with long-term monitoring and management of a closed storage facility following the issuance of the certificate of project completion.

Comments

Fee will be split 50/50 between pre-closure management and long term stewardship fund.

Texas

Name of Fund

Anthropogenic Carbon Dioxide Storage Trust Fund

Fee

$0.025 per metric ton of CO_2 injected

Uses

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

Utah

Name of Fund

Carbon Dioxide Storage Fund

Fee

Fees to be set

Uses

a) Defray the division's regulatory expenses incurred during the regulation of a storage facility:

   i) construction;

   ii) operation; and

   iii) pre-closure activities;

b) make determinations in accordance with Section 40-11-20;

c) reimburse a regulatory agency with whom the board has entered into a cooperative agreement described in Section 40-11-18 for expenses the cooperating agency incurs in conducting the activities described in Subsections (4)(a) and (b);

d) permit, inspect, monitor, investigate, record, and report on geologic storage facilities and associated carbon dioxide injection wells;

e) perform long-term monitoring of geologic storage facilities and associated carbon dioxide injection wells;

f) remediate mechanical problems associated with geologic storage facilities and associated carbon dioxide injection wells;

g) repair mechanical leaks at geologic storage facilities;

h) plug abandoned carbon dioxide injection wells used for geologic storage;

i) training and technology transfer related to carbon dioxide injection and geologic storage;

j) perform compliance and enforcement activities related to geologic storage and associated man-made carbon dioxide injection wells; and

k) oversee the management of the geologic storage facilities and associated carbon dioxide injection wells after site closure.

Comments

Fund covers pre-closure activities as well as long term stewardship.

West Virginia

Name of Fund

Carbon Dioxide Storage Facility Trust Fund

Fee

$0.13 per metric ton of CO_2 injected

Uses

1) Defend, indemnify, and hold harmless the pore space and surface owners against all claims associated with the stored carbon dioxide;
2) Monitoring and managing the storage facility until such time as the federal government assumes responsibility for the long-term monitoring and management of storage facilities;
3) To compensate a cooperating agency, through a cooperative agreement with another agency, for expenses that cooperating agency incurs in carrying out regulatory responsibilities that agency may have over a storage facility.

Wyoming

Name of Fund

Geologic Sequestration Special Revenue Account

Fee

$0.07 per metric ton of CO_2 injected

Uses

1) The testing, monitoring and long-term inspections of geologic sequestration sites;

2) Remediation of mechanical problems associated with remaining wells and infrastructure;

3) Plugging and abandoning monitoring wells;

4) All future claims associated with the release of carbon dioxide from the geologic sequestration sites following site closure project completion certification, release of all financial assurance instruments and termination of the permit.

Abbreviations and Terms Used

The Board - When capitalized, the governing board of the Colorado Geologic Storage Stewardship Enterprise

CCUS - Carbon capture, utilization, and storage

CDPHE - Colorado Department of Public Health & Environment

The Chair - The chair of ECMC's professional commission

CO_2 - Carbon dioxide or "Injection Carbon Dioxide" as defined in ECMC's Class VI rules

The Commission - When capitalized, the professional commission of the Energy and Carbon Management Commission

COGCC - Colorado Oil and Gas Conservation Commission, now ECMC

DAC - Direct air capture

The Director - The director of ECMC

ECMC - Energy and Carbon Management Commission

The Enterprise - When capitalized, the Colorado Geologic Storage Stewardship Enterprise

EPA - United States Environmental Protection Agency

The Fund - When capitalized, the Colorado Geologic Storage Stewardship Enterprise Cash Fund

GEMM - Greenhouse Gas Emissions and Energy Management

GHG - Greenhouse gas

HB - House Bill

LTS - Long-term stewardship

PISC - Post-injection site care

Primacy - Primary enforcement authority

SB - Senate Bill

TABOR - Taxpayer's Bill of Rights

The State - When capitalized, the State of Colorado as an entity

USDW - Underground source of drinking water