PEMBINA Institute

SUBMISSION

Unlocking carbon storage space in Ontario

Pembina Institute comments and recommendations

Submitted to Ministry of Natural Resources

Regarding: The Geologic Carbon Storage Act

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Recommendations

- The Pembina Institute recommends that pore space ownership be held by the Crown, but that any surface land access for project development require landowner consent.
- Free, prior and informed consent from Indigenous communities should be required for carbon storage projects as well as the development of the Geologic Carbon Storage Act.
- *In situ* mineralization should be included within the Act as a method of geologic carbon storage, and safety requirements should be specified for each formation type.
- Clarification is requested on the specifics of how the Carbon Storage Stewardship Fund will be funded to ensure its sustainability.

Context

The Pembina Institute welcomes the opportunity to provide input on the development of geological carbon storage solutions by providing comments on the Geologic Carbon Storage Act proposed on November 25, 2024.[1]

We commend the Government of Ontario for taking decisive action to enable carbon storage through legislation. Geologic carbon storage is a critical component for emissions reductions technologies like carbon capture and storage, as well as carbon removal solutions like direct air capture, bioenergy with carbon capture and storage, and *in situ* mineralization.

[1] https://ero.ontario.ca/notice/019-9299

By drawing on insights from other jurisdictions with established carbon storage regulations, Ontario can proactively address potential challenges while tailoring its approach to the province's distinct geological, environmental and socio-economic conditions.

Discussion and recommendations

The Pembina Institute is supportive of enabling commercial-scale geologic carbon storage in Ontario. However, we have several points of consideration for the Ministry of Natural Resources.

Separate from what is proposed in the Act, industry and government need to invest in obtaining a better understanding of Ontario's subsurface storage capacity to inform safe and sustainable project design and protective regulatory approvals.

To this end developers seeking storage permits must conduct extensive assessments of the subsurface and be required to provide this information to the Crown.

Crown ownership of pore space

We recommend that ownership of pore space under both public and private land be held by the Crown, but that any surface land access for project development require consent from the corresponding landowner.

We feel this would balance support for project development, recognition of pore space as a public good, and the rights of individual landowners.

The Pembina Institute commends Ontario's efforts to provide clarity on pore space ownership, as well as the efforts to minimize conflicts between landowners and commercial activities by proposing a hybrid system between private landowners and the Crown. However, this approach has the potential to create conflicts between private landowners, project developers and surrounding communities.

Underground geologic formations do not contour to the borders of surface land ownership. As a result, storage projects will likely have to contend with multiple landowners. These landowners each present their own interests at the table, making it difficult to coordinate the use of pore space for carbon storage.

By contrast, other provincial governments that have developed carbon storage regulations either own the pore space or have the authority to grant pore space rights to developers.[2] Models like

[2] https://www.torys.com/en/our-latest-thinking/publications/2024/08/cross-country-carbon-capture-and-sequestration-check-in

these support project development by ensuring access will be reliable and fair, thus providing investment confidence and simplifying project development.

That said, the potential impacts on the land need to be recognized. Landowners should have to consent to any access or development on their land. Not doing so creates potential for conflict and erodes trust between stakeholders.

Free, prior and informed consent from Indigenous Peoples

We recommend that free, prior and informed consent from Indigenous communities be required for carbon storage projects.

This is in alignment with the principles of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP), which Canada has implemented through legislation. While consultation satisfies legal obligations under section 35 of the Constitution Act, 1982, moving beyond consultation to consent reflects a higher commitment to reconciliation and shared decision-making. Collaborative approaches help ensure mutual benefits, minimize conflict and foster trust, showing that the government values Indigenous voices as equal partners in decision-making rather than treating consultation as a formality.

This extends not just to individual carbon storage projects, but also the development of this Act. In a written comment to the discussion paper, *Regulating Commercial-Scale Geologic Carbon Storage Projects in Ontario*, published July 2024, the Chippewas of Kettle and Stony Point First Nation stated that additional accommodations need to be made to allow for proper consultation in the process of developing this Act.[3] The comment also notes that proper studies that include Indigenous traditional knowledge need to be conducted to ensure environmental risks — particularly those to the lakes — are fully understood.

Distinguishing storage formations and safety requirements

We recommend that *in situ* mineralization be included within the Act as a method of geologic carbon storage, and that specific safety requirements are specified for each formation type.

Geologic carbon storage is possible through different trapping mechanisms in different underground formations. Deep saline aquifers, depleted oil and gas reservoirs, and formations well-suited for *in situ* mineralization like igneous rock, can all be considered as potential underground storage sites. Though less common than supercritical carbon dioxide storage, *in situ* mineralization has been demonstrated commercially in Iceland. We recommend that the

[3] https://ero.ontario.ca/comment/100270#comment-100270

Act recognize the storage of carbon dioxide across these sets of formations and distinguish safety and measurement requirements specific to each type.

These would include:

- **Ensuring that saline aquifer or depleted oil and gas reservoir carbon storage sites are confined by an impermeable rock layer.** These storage sites rely on structural trapping, the physical trapping of carbon dioxide within a reservoir, to keep it from migrating or leaking. An impermeable rock layer is critical for ensuring the carbon dioxide remains in the storage site. Existing well bores and other features that could compromise containment must be properly managed and monitored.
- **Implementing a minimum 800-metre depth requirement for a saline aquifer or depleted oil and gas reservoir to ensure the carbon dioxide remains in a dense phase**. Requiring a minimum depth of 800 m — as previously considered in the discussion paper — ensures the carbon dioxide remains in a highly dense supercritical state, reducing the potential for leakage due to buoyancy.[4] This, in conjunction with an impermeable rock layer, acts as an additional layer of protection.
- **Developing separate criteria for *in situ* mineralization projects**. We recommend that safety criteria be specific to the type of geologic storage. To that end, appropriate study of *in situ* mineralization in Ontario is required to establish necessary regulations. This type of storage relies on mineralization trapping, which renders the carbon dioxide into a stable carbonate solid. Therefore, direct application of safety regulations for other storage mechanisms are inappropriate.
- **Specific measurement, monitoring and verification standards for each formation type, including clarity around requirements before liabilities are transferred to the Crown after site closure**. Measurement requirements would differ depending on the formation and associated primary trapping mechanism. For example, *in situ* mineralization monitoring would need to verify the rate of mineralization, whereas storage in depleted oil and gas reservoirs and saline aquifers would require the monitoring of carbon dioxide plume migration for containment loss through existing wellbores and geologic structures.

Lastly, clarification around the intended duration of long-term storage is requested. Geologic storage should be developed to ensure secure storage of carbon dioxide for thousands of years.

[4] https://netl.doe.gov/carbon-management/carbon-storage/faqs/carbon-storage-faqs

Municipal endorsement

We recommend that a formal process for municipal consultation be established for carbon storage projects, but that the default requirement for municipal endorsement be removed.

Local engagement is crucial for any industrial development. Project developers need to meaningfully engage with local communities, ensuring that they are well informed and have their concerns addressed. Local communities are impacted the most by industrial development and should have a voice at the table.

However, a blanket requirement for municipal endorsement adds an additional unnecessary barrier to the development of projects that stand to benefit the public good. This requirement would stand in contrast to other industrial development and would not provide additional value to project developers or the public.

Municipal endorsement would be required in cases where it can be demonstrated that the municipality is directly impacted by the project. This could be, for example, situations where access to municipally-owned land is required. To assess the direct impact of a project on a municipality, a list of criteria could be established that triggers the requirement of municipal consent if met.

Clarification on minimum volume and emitter thresholds

We request clarification of the minimum volume of carbon dioxide, and if that threshold is the same for both commercial and research and evaluation licences. We suggest that thresholds are set to ensure that newer technologies — including those that involve the removal of carbon dioxide directly from the atmosphere for underground storage — are able to develop. The success of these maturing technologies relies on learning-by-doing to improve efficiencies and lower costs. Ontario will not be able to reap the benefits of a carbon dioxide removal industry unless it allows the development of smaller operations that can progressively scale up to larger sizes.

The proposal includes the requirement of a minimum number of industrial emitters in order for a storage permit to be issued. We seek clarification on the rationale for this inclusion as well as what the minimum number of industrial emitters is. Carbon dioxide removal projects are inherently not tied to industrial emissions, since they extract carbon dioxide from the atmosphere. We recommend that any minimum emitter stipulations consider projects without point-source emissions.

Clarification to ensure sustainability of Carbon Storage Stewardship Fund

We request clarification on the funding model for the Carbon Storage Stewardship Fund, including details such as how payments from developers will scale relative to volume injected and the schedule of payments, which will be impactful on project development. Care should be taken to design the model such that the fund can sustainably grow to match the size of growing liabilities. We recommend thoughtful planning on this now to ensure the fund can sufficiently grow over time to handle future liabilities, thereby avoiding pitfalls faced by similar structures in other jurisdictions in the past. At minimum, there are best practices that can be adopted from other liability management systems, including but not limited to mandatory reporting and transparency of injection volumes and costs.

Conclusion

In closing, we would like to express our gratitude for the development of geologic carbon storage regulations in Ontario. Thank you for the opportunity to provide written comments on the Geologic Carbon Storage Act. We look forward to continued engagement in this issue.