

DISCUSSION PAPER:

**REGULATING COMMERCIAL-SCALE GEOLOGIC
CARBON STORAGE PROJECTS IN ONTARIO**

July 2024

Introduction

In 2018, the government of Ontario committed to reducing greenhouse gas emissions to 30 per cent below 2005 levels by 2030, a target that aligns with the Federal Government's commitments under the Paris Agreement.

Ontario has made significant progress. Our total greenhouse gas emissions have dropped by 22 per cent since 2005 – even while the rest of Canada saw emissions increase by 3 per cent during that same time. Ontario will continue to do its part.

Capturing carbon dioxide (“CO₂” or “carbon”) and permanently storing it in deep geological formations could provide industries in Ontario with a critical tool for reducing their emissions and contributing to the achievement of Ontario's emissions reduction targets.

Geologic carbon storage (further referred to as carbon storage) involves injecting captured CO₂ into deep geological formations for permanent storage. Carbon storage is increasingly being recognized as a safe and proven technology and has already been enabled in several jurisdictions around the world, including British Columbia, Alberta, Saskatchewan, the United States, the United Kingdom, Norway, and Australia, amongst others. Carbon storage technology has been in use for more than 50 years, and around 300 million tonnes of CO₂ have already been successfully captured globally and injected underground¹. According to the Intergovernmental Panel on Climate Change and the International Energy Agency, there is no credible path to net-zero emissions without carbon management technologies, and their deployment must be rapid and immense, scaling up by nearly 200 times by 2050.²

Like any industrial activity, geologic carbon storage needs to be carried out in a safe and responsible manner as it also presents certain risks. The primary concern with geologic carbon storage is the potential for CO₂ leakage from the storage site. If there are leaking wells, faults, or fractures in the rock layers above the storage reservoir, CO₂ could migrate to the surface, potentially impacting the atmosphere and drinking water sources and pose risks to people and the environment. If not done safely, the injection of CO₂ into deep geological formations can also induce increased seismic activity as the increased pressure from injection may reactivate existing faults or create new ones, although most induced seismicity associated with geologic carbon storage is expected to be small. To manage these risks, there is a need for careful site characterization and selection and monitoring through-out the project's lifecycle, including long-term monitoring.

Carbon storage is new to Ontario and developing a comprehensive framework to regulate this activity would help ensure that it is done responsibly, with measures in place to safeguard people and the environment. Establishing a clear legislative and regulatory framework for these projects will be key to realizing the potential benefits and managing the potential risks associated with geologic carbon storage, including minimizing the potential for leaks to the surface or drinking water sources, induced seismicity, or interactions with other resource activities.

To enable the safe and responsible development of commercial-scale carbon storage projects in Ontario, the Ministry of Natural Resources (the ministry or MNR) is proposing to create a

¹ Global Carbon Capture and Storage Institute Ltd. <https://www.globalccsinstitute.com/resources/>(click on Storage). Used under Creative Commons Attribution

² International Energy Agency (IEA) (2021) Net Zero by 2050. <https://www.iea.org/reports/net-zero-by-2050>

legislative and regulatory framework that would, if approved, enable the development of technology-ready commercial-scale projects and the continued testing and demonstration of newer technologies.

Development of commercial-scale carbon storage projects in Ontario could help:

- Support emissions reduction and the production of low-carbon hydrogen.
- Support the transition to a low-carbon economy.
- Preserve high-value jobs, attract investment, and encourage innovation.
- Ontario businesses take advantage of federal incentives for carbon storage.

Different jurisdictions have taken different approaches in developing regulatory frameworks for commercial-scale carbon storage projects. Some jurisdictions, like Alberta and British Columbia incorporated requirements governing carbon storage activities into existing legislative frameworks. The province of Manitoba has recently introduced a new stand-alone bill that if proclaimed into force, would govern the storage of carbon dioxide in geological formations in that province. Regardless of the approach taken in Ontario, the development of a commercial-scale regulatory framework would most likely require amendments to several existing statutes and regulations and the development of broad regulation-making authority sufficient to allow the province to clarify, supplement and refine Ontario's framework in the future.

The ministry is seeking feedback on the design of a commercial-scale regulatory framework in Ontario. The sections included below outline various components often included within regulatory frameworks currently in place in other jurisdictions that the ministry is considering incorporating into the design of Ontario's proposed framework. Questions are also included at the end of the document seeking feedback on how these components could be incorporated into the design of a commercial-scale carbon storage regulatory framework in Ontario.

Ontario's phased approach to enabling geologic carbon storage

Ontario is taking a measured and phased approach to enabling and regulating geologic carbon storage in Ontario. This approach is intended to provide clarity for businesses to plan and invest in Ontario, while ensuring the safe and responsible development of geologic carbon storage projects in the future.

In the first phase of [Ontario's Roadmap](#) for enabling geologic carbon storage, and following consultation on a [discussion paper](#) posted in January 2022, changes were proposed through Bill 46, Less Red Tape, Stronger Ontario Act, 2023 to remove a prohibition on carbon storage from the *Oil, Gas and Salt Resources Act*. These changes received Royal Assent on March 22, 2023.

In the second phase, the government made further amendments to the *Oil, Gas and Salt Resources Act* to provide for 'special projects' to test, assess, pilot, or demonstrate new technologies, methods, or activities such as, but not limited to, carbon storage, and to enhance public safety. These changes received Royal Assent on June 8, 2023.

From September to October 2023, the ministry consulted on implementing a regulation to allow proponents to seek approval for special projects, including carbon storage. This regulation took effect on January 1, 2024. While the framework for special projects applies equally to both Crown and private lands, currently, carbon storage projects can only occur on private land. Further legislative changes would be required before Crown land could be used for carbon storage.

In phase three, the government is now working on the development of a proposed framework for full-scale commercial carbon storage projects. The feedback obtained in response to this consultation, as well as lessons learned from reviewing Canadian and international jurisdictions with frameworks already in place, will help to inform the design of the ministry's proposed approach to regulating commercial-scale carbon storage projects in Ontario.

Ontario's commercial-scale framework would focus on the regulation of carbon storage within underground geological formations. Carbon storage or sequestration activities that do not involve the use of wells to inject CO₂ into geological formations would not be subject to the new framework.

Where should commercial-scale carbon storage projects be permitted to occur?

Not all underground geological formations are suitable for carbon storage. Geologic storage areas need to occur within geological formations of sufficient depth, size and seal, and pores found within storage areas need sufficient size and connections to allow injected CO₂ to flow.

In addition, some forms of geologic carbon storage are more technologically advanced than others. The most technically mature forms of geologic carbon storage include storage in saline aquifers, and storage in depleted oil and gas reservoirs.

As a result, the most viable opportunities for geologic carbon storage in Ontario likely exist in southwestern Ontario in areas already associated with oil and gas production, and the geologic storage of other substances, and where saline aquifers and depleted oil and gas reservoirs are found. Much of the potential storage capacity available in southwestern Ontario is expected to be found under Crown-owned land beneath the beds of Lake Erie and Lake Huron.

To help provide for the safe and responsible development of technology-ready commercial-scale projects, Ontario's framework could initially focus on enabling commercial-scale projects within saline aquifers and depleted oil and gas reservoirs in southwestern Ontario at depths of 800m or more.

Storage at depths of 800m or below is more efficient than storage at shallower depths and can help ensure that CO₂ remains in a supercritical state and permanently stored and reduce the potential for projects to interfere with other surface and subsurface activities, including agriculture. Storage within saline aquifers and depleted oil and gas reservoirs is the most technologically advanced method of permanently storing CO₂ within geological formations and can be guided by industry standards such as the Canadian Standards Association standard *Z741:12: Geologic Storage of Carbon Dioxide*. Finally, southwestern Ontario, with its high concentration of high emission industries, oil and gas reservoirs and saline aquifers may make it an ideal area in which commercial-scale carbon storage activities can begin to occur.

To continue to advance the development of new technologies, projects that do not meet the above criteria could be permitted under a testing and demonstration permit. As technology is developed, and industry needs continue to advance, the framework could be expanded in the future to allow additional commercial-scale operations in other areas, at other depths, and within other types of rock (e.g., ultramafic rock), provided that it is demonstrated to be safe to do so.

What type of commercial-scale projects would be developed?

Based on a review of commercial-scale carbon storage projects being advanced in Canada and around the world, the ministry expects proponents would seek to develop two kinds of commercial-scale projects: standalone projects and carbon storage hubs.

Standalone carbon storage projects seek to store the CO₂ produced by a single emitter within geological formations. Standalone projects may be quicker to plan and build and may occupy a smaller project area, but the significant upfront costs associated with developing a standalone project can make them unviable for some industrial emitters.

In comparison, carbon storage hubs seek to store the CO₂ produced from various emissions sources. Carbon storage hubs can take longer to plan and build but can benefit from economies of scale in comparison to standalone projects and can therefore enable the storage of CO₂ produced by a wider range of emitters. While both types of projects may be advanced, southwestern Ontario, with its high concentration of CO₂ emitting industries and geological storage potential may be a prime location for the development of one or more carbon storage hubs if it is demonstrated to be safe to do so.

If approved, the province could use a competitive process to select proponents to use Crown-owned land to develop carbon storage projects similar to the [competitive processes used by the province of Alberta](#) to select proponents to develop carbon storage hubs. This process could begin with the issuance of a formal Request for Project Proposals that, once received, could be evaluated on a range of criteria such as:

- the safety record, operational expertise, regulatory experience, and financial history of the proponent
- the proponent's ability to ensure robust public and Indigenous consultation and build public confidence in the project moving forward
- socio-economic benefits (e.g., employment, positive social impacts to surrounding communities, etc.)
- an evaluation of potential project impacts on the agricultural system, including agricultural operations, lands and agribusinesses
- total emissions reduction potential
- provision of open access or storage partnerships with other industry members
- benefits to Indigenous communities (e.g., First Nation co-developments); and
- overall project economics.

Companies selected to explore the development of carbon storage projects on Crown-owned land would first assess the suitability and safety of geological formations located under Crown-owned land. If a proponent were to demonstrate that its proposed project could provide safe and permanent storage, the company would be able to apply for approval to permanently store CO₂ under Crown-owned land.

Using a competitive process to select proponents to evaluate Crown-owned lands for their suitability for commercial-scale geologic carbon storage could help to achieve the following benefits in relation to Crown resources managed by the province:

- Optimize the use of the limited storage potential available in the province.
- Result in the selection of highly qualified proponents with sufficient technical, financial, and operational capacity to develop and manage commercial-scale carbon storage projects.
- Help ensure that commercial-scale carbon storage projects would be deployed in a responsible, safe, and strategic manner.
- Minimize challenges associated with numerous, and potentially overlapping, storage proposals.

Projects entirely on private land could be advanced while proposals to develop carbon storage projects on Crown lands are reviewed, and proponents selected.

Proponents seeking to develop carbon storage projects on Crown-owned land would need to obtain a license or lease from the ministry granting them with the exclusive rights to use Crown-owned land within a given area for the purpose of carbon storage. If granted, the holder of a license or lease would be required to pay rent for the use of Crown-owned land. While a license or lease would provide a proponent with the exclusive right to use Crown-owned land for carbon storage, it would not grant the lease holder with any rights to other resources or to carry out other activities within the area of a lease. It is proposed that the Crown would have the ability to grant other rights in the same area for activities that would not interfere with the storage of CO₂.

How should commercial-scale projects be authorized?

If approved, Ontario's framework would need to establish a licensing scheme that provides proponents with a clear understanding of the steps involved in obtaining approval to develop a commercial-scale carbon storage project and helps to ensure that projects would be developed in a safe and responsible manner.

Most jurisdictions that regulate carbon storage issue authorizations in stages. The first stage often involves authorizing proponents to explore for and evaluate geological formations for their suitability for commercial-scale carbon storage. Once geological formations have been evaluated and shown to be suitable for carbon storage, proponents are then able to apply for a licence or permit authorizing them to begin injecting and permanently storing CO₂ into deep underground formations.

As such, Ontario could also consider issuing authorizations for commercial-scale carbon storage projects in stages that align with the typical phases of a carbon storage project.

Proponents could first apply for an evaluation permit authorizing them to use wells to conduct exploration, evaluation, and testing activities to assess the viability of the site for commercial operations and to gather information needed to inform the design, operation and decommissioning of a future commercial project. Evaluation permits could be timebound (e.g., 3-5 years), with the ability for the ministry to renew the permit in limited circumstances, if necessary, subject to any terms and conditions being met.

At the second stage, once geological formations would have been evaluated, proponents could apply for a storage permit authorizing them to carry out activities to permanently store CO₂ within an evaluated geological formation. Storage permits could be issued for a specific period (e.g., 15-20 years) with the ability to renew the permit subject to any terms and conditions established by the ministry.

The province would need to specify the application process including the activities proponents would need to complete when seeking an authorization which may involve requiring proponents to:

- Meet any qualifications and eligibility requirements prescribed by the regulations to demonstrate that the proponent has the sufficient capability, qualifications, and experience to undertake the activities being proposed.
- Provide detailed plans, technical reports, analyses, and other documentation to support their project including risk assessments, characterization studies, monitoring, measurement, and verification (MMV) plans, closure plans and information related financial assurance in support of their projects.
- Assess the project area for the presence of and potential interaction with other underground resources, surface, and subsurface activities.
- Demonstrate that impacts on the agricultural system, including agricultural operations, land and agribusinesses are avoided, or where avoidance is not possible, minimized and mitigated (e.g., through the completion of an Agricultural Impact Assessment).
- Conduct notification and engagement activities at various stages of their project, with the provision of certain information, including prior to seeking permits to explore for or store CO₂ in geological formations and to report on the findings of their MMV activities.
- Provide financial assurance, for example in the form of a letter of credit or trust, in relation to the construction, operation, decommissioning and post-closure management phases of the project.
- Demonstrate that impacts on other subsurface activities have been considered and all necessary surface rights and subsurface rights required for their project to proceed have been obtained.

The province could require that any information submitted in support of an application be prepared by qualified persons, including by regulated professionals where applicable (e.g., Professional Engineers, and Professional Geoscientists) and make information or analysis provided by proponents as part of an application subject to external or third-party expert review where needed.

Ontario's framework could provide the MNR with broad discretion to approve applications subject to any terms and conditions established by the Minister or to refuse an application and allow proponents to request a hearing related to refusal decisions or any terms and conditions attached to an authorization.

If approved, the framework would need to define the scope of activities subject to the framework, such as scoping authorizations to include activities involving the drilling and use of wells and the subsurface reservoir, but exclude any pipelines or equipment associated with a carbon storage project beyond the first emergency shutdown valve downstream of the wellhead, other than pipelines and equipment used to drill, maintain, or decommission the wells. Other aspects of commercial-scale carbon storage projects beyond the scope of using wells to evaluate or store CO₂ within geological formations, such as the transportation of CO₂ to a storage site (e.g., via pipeline, truck, etc.) would be beyond the scope of activities subject to authorizations issued under the framework.

In some jurisdictions, proponents who receive an evaluation permit or storage permit are still required to obtain separate approvals authorizing them to drill or use wells. For example,

proponents looking to conduct evaluation activities would first obtain an evaluation permit and apply for a well licence authorizing them to drill any evaluation or testing wells needed to evaluate a geological formation. While this increases the number of approvals a proponent is required to obtain, it can also break the approval process down into smaller steps for proponents. Alternatively, Ontario's framework could take more of a project-based approach to its approvals and grant proponents with the authority to drill new wells or use existing wells through the issuance of an evaluation permit or storage permit.

As in other jurisdictions, commercial scale carbon storage projects may be subject to a range of other municipal, provincial, and potentially federal legislative frameworks and approvals.

How should special projects be transitioned into the commercial-scale framework?

As part of Phase 2 of Ontario's Carbon Storage Roadmap, changes were made to the *Oil, Gas and Salt Resources Act* to allow proponents to request a special project designation allowing proponents to test, assess, pilot, or demonstrate a technology, method or activity that is new or innovative to Ontario.

While a special project designation could be used to test, assess, pilot, or demonstrate any new or innovative technology, method or activity that involves using a new or existing well, some proponents have begun seeking a special project designation allowing them to begin testing, assessing, piloting, or demonstrating carbon storage technologies in Ontario.

If approved, Ontario's commercial-scale framework could allow these previously approved carbon storage special projects to be transitioned into the new framework, subject to any requirements prescribed by regulation. Including provisions to enable these projects to transition to the new framework could help ensure holders of a special project designation experience a smooth transition.

How should proponents obtain rights to pore space?

Geologic carbon storage involves injecting CO₂ into "pore space" – naturally formed minute voids between solid grains of minerals that make up rock. Pore space is like the small holes within a sponge that hold water. Proponents wishing to store CO₂ within that pore space must either own that pore space or gain permission from the owner of that pore space to use it.

Determining who to get permission from can be difficult in jurisdictions that have not explicitly defined who owns the underground pore space where CO₂ would be stored. At common law, Ontario landowners typically own the subsurface below their lands except where interests have been granted or leased, or rights were reserved in the original grant. To provide clarity on the ownership of pore space, some jurisdictions have included provisions within their regulatory frameworks that clearly establish who owns the pore space in which CO₂ may be stored.

In Alberta, the Crown has, by legislation, declared all pore space to be Crown property. Manitoba introduced legislation in April 2024 that, if proclaimed, would also vest pore space ownership in the Crown. In British Columbia, the Crown has, by legislation, granted the government the right to access, explore for, develop, and use storage reservoirs for the purpose of storing or disposing of CO₂, with the ability to grant such rights to proponents. As a result, proponents wishing to develop a carbon storage project in Alberta and British Columbia can

obtain the right to explore for, develop and use pore space in those jurisdictions directly from the province. By vesting ownership of pore space in the Crown or granting the government the right to explore for, develop, and use storage reservoirs for the purpose of carbon storage, these jurisdictions have elected to treat pore space as a public resource to be managed by government in the public interest.

In comparison, some US States have, by legislation, declared that pore space is vested in the owner of the surface estate. Proponents wishing to develop a carbon storage project in these States obtain access to pore space by purchasing lands or negotiating lease agreements with landowners. In some States, if a proponent is unable to reach an agreement with the pore space owner, proponents can seek an order to combine pore space ownership interests within a proposed storage reservoir, which could require non-consenting landowners to participate and allow access to their pore space. In most cases, these orders are issued by a third-party decision-maker such as a board or commission. While processes vary by state, they tend to operate somewhat similarly to processes currently used in Ontario to obtain a unitization order for commercial oil and gas activities. Proponents seeking such an order are typically required to meet certain tests, which can include demonstrating that:

- they have obtained consent from landowners owning a majority of the pore space contained within the proposed storage reservoir
- they have made a good-faith effort to obtain the consent of all persons who own pore space within the proposed storage reservoir
- non-consenting owners will be compensated equitably in relation to landowners who have already entered into agreements with the proponent; and
- the joining of ownership interests would help optimize the use of pore space within a given area.

Ontario could also consider modeling its approach after the process and requirements in place for natural gas storage projects. The *Ontario Energy Board Act, 1998* gives the Ontario Energy Board (OEB) the authority to issue orders designating an area as a natural gas storage area. The OEB has the authority to issue an order authorizing a person to:

- inject natural gas into, store natural gas in, and remove natural gas from a designated storage area; and
- enter into and upon the land in the area and use the land for that purpose.

A person authorized by an order is required to provide just and equitable compensation to:

- the owners of any gas or oil rights or of any right to store gas in the area; and
- the owner of any land for any damage necessarily resulting from the exercise of the authority given by the order.

If an agreement could not be reached between the person who has received an order and a rights holder or landowner, compensation amounts could be determined by the OEB.

Different approaches to pore space ownership could provide different benefits:

Adopting an approach similar to the approaches taken in Alberta and BC could:

- Align Ontario's framework with frameworks in place in other Canadian jurisdictions.

- Help to optimize the use of the limited pore space available in the province.
- Support the development of carbon storage hubs capable to storing CO₂ from various emissions sources.
- Lead to the timelier development of commercial-scale carbon storage projects.
- Simplify the management of geological formations that span Crown and private land.
- Provide financial benefits to landowners through the leasing of surface rights.
- Provide greater certainty to industry and improve the economic viability of carbon storage projects in Ontario.

Adopting an approach similar to the approach taken in various US States, or based on the approach used by the Ontario Energy Board for natural gas storage could:

- Align Ontario's framework with frameworks already in place in Ontario for oil & gas production and natural gas storage activities.
- Provide financial benefits to landowners through the leasing of surface and storage rights.
- Give landowners more say in deciding when and where projects are developed.
- Encourage the development of smaller standalone projects.
- Limit government involvement in the acquisition of rights to explore for, access and use pore space and in granting those rights to proponents.

To help ensure rights related to carbon storage are clear, the province could require that any rights associated with a carbon storage project be registered on title.

How should proponents gain surface rights, or any other rights required for their project?

In addition to setting out the steps proponents would need to take to obtain rights to store carbon within pore space, Ontario's framework would also need to address any additional rights that would need to be secured by a proponent for their project to move forward. This could include, but may not be limited to, obtaining any rights required to:

- Access the surface.
- Authorize the drilling of wells and construction of associated buildings and equipment.
- Complete any monitoring, measurement, and verification (MMV) and decommissioning activities.
- Respond to any potential incidents and complete any remediation activities that may be required.

Requirements for obtaining surface and other subsurface rights that may be required could be similar to the requirements currently in place for oil and gas and other subsurface storage activities in the province. This would place the onus on proponents to identify any potential impacts of the proposed project to other subsurface activities, secure all other surface and subsurface rights required for their project to move forward and demonstrate that such rights have been obtained when seeking ministry authorizations.

Another approach that could be considered, which some jurisdictions have established, is to establish mechanisms that would allow proponents to request an order granting them surface rights in situations where agreements cannot be reached with landowners, if such rights are required to for the drilling or operation of a well, or to carry out certain activities, such as MMV activities or completing remedial activities that may be required over the life of the project.

How should proponents notify and engage with Indigenous communities and other potentially affected parties?

In other jurisdictions where carbon storage projects are being developed, proponents are often required to notify, engage, and consult with Indigenous communities and to notify and consult with other parties who may be affected by the proposed project.

If approved, Ontario's framework would also need to specify the notification and engagement activities that proponents of commercial scale and testing and demonstration projects would be required to carry out at various stages of their project, including prior to seeking permits to explore for or store CO₂ in geological formations. Provisions in this regard would set out the information that would be required to be shared.

Proponents could, for example, be required to notify and conduct engagement with parties who may be impacted by the proposed project, such as:

- Indigenous communities and organizations.
- Landowners, rights holders, local municipalities, and regional municipalities.
- Persons who own or are responsible for any existing wells, surface or subsurface operations, easements or right of ways.
- Other ministries or agencies.

The ministry would also need to assess the potential for adverse impacts on Aboriginal or treaty rights and ensure required consultation or accommodation would have been carried out prior to making any authorization decisions.

What level of financial assurance should be provided by proponents?

Carbon storage frameworks in other jurisdictions commonly include requirements for operators to provide financial assurance addressing the liabilities that an operator may incur over the lifespan of a carbon storage project.

Financial assurance can be used to address a variety of potential liabilities such as:

- Project or facility decommissioning, abandonment and remediation activities.
- Leakage or migration of stored CO₂ and any damages.
- Non-compliance with operational requirements.
- Post-injection and post-closure monitoring, measurement, and verification (MMV) and stewardship.
- Emergency and remedial response.

Ontario already requires operators of special projects under the *Oil, Gas and Salt Resources Act* to provide financial assurance when seeking ministry authorization to drill or use wells and

to obtain insurance coverage, including but not limited to liability and pollution coverage. If approved, Ontario's commercial-scale regulatory framework could include similar requirements for operators seeking approval for commercial-scale evaluation and storage activities.

Proponents could be required to provide full-cost financial assurance for their projects in an amount sufficient to cover costs associated with the closure of evaluation activities and commercial scale carbon storage projects, the abandonment and decommissioning of wells, the completion of site remediation, and post-closure monitoring and maintenance activities.

Proponents could be required to establish financial assurance in advance of activities being undertaken or could be permitted to provide that assurance in phases based on significant project milestones. Financial assurance could be required in the form of an irrevocable letter of credit or trust established by the proponent and could be periodically reviewed and adjusted as needed to ensure that adequate funds are maintained throughout the life of the project. Financial assurance provided by proponents to cover costs associated with site closure could also be returned to the proponent in stages as closure, remediation, and post-closure MMV activities are completed.

How should the province provide oversight of carbon storage projects?

A critical component of any commercial-scale carbon storage framework would be ensuring that sufficient operational controls and requirements are in place to provide for the safe and responsible management of carbon storage projects throughout their lifecycle.

Ontario's regulatory framework would need to establish clear requirements for operators to meet, such as requirements to:

- Design, develop and operate their facilities in accordance with technical standards such as *CSA Z-741 Geological Storage of Carbon Dioxide*, subject to any potential exemptions.
- Operate in accordance with approved plans (e.g., design, drilling and completion of well, emergency management and response, decommissioning and closure, and monitoring, measurement, and verification (MMV) plans), any conditions included within ministry authorizations, and any regulations that may be made.
- Prepare periodic reports demonstrating the proponent's compliance with approved plans – including compliance with the approved MMV plan and any associated findings.
- Complete periodic reviews and updates of approved plans (e.g., reviewing and updating risk assessments, the MMV plan, and preliminary closure plan and financial assurance every 3 - 5 years).
- Provide, and/or make publicly available, any information or reports detailing geologic information, operational activities, monitoring results, and incidents, as required by ministry authorizations or prescribed by regulation. Similar to the approach used for special projects, information of a sensitive nature, including commercially sensitive information or financial information, provided to the ministry in confidence, that meets specific tests for potential harm to the operator would not be required to be made publicly available.

If approved, Ontario's commercial-scale regulatory framework would need to provide that carbon storage projects would be subject to ongoing compliance monitoring and enforcement activities carried out by the ministry.

A range of compliance and monitoring provisions could be included within Ontario's framework such as granting the ministry the authority to:

- appoint inspectors and auditors and provide them with sufficient authority to help ensure operators comply with the framework (e.g., entry on land, issuing compliance orders, etc.)
- amend the terms of an existing authorization subject to any procedures outlined in regulation
- suspend or revoke authorizations issued by the ministry in instances where an operator is found to have failed to comply with requirements specified within legislation, regulations, authorizations, applicable standards, or compliance orders
- require an operator to obtain an independent third-party review of the operator's compliance with any requirements outlined within legislation, regulations, authorizations and applicable policies or standards, or compliance orders; and
- require operators to develop an action plan to address any findings identified by an independent audit.

The ministry could provide operators with prior notice of the ministry's intent to amend, suspend or revoke an authorization and provide the operator with an opportunity to request a hearing. Where a compliance order has been issued, operators could also be provided with an opportunity to appeal the order, and an appeal could temporarily pause the order unless the minister was of the opinion that an immediate order is necessary to protect people and the environment.

The framework would establish offences for non-compliance with the framework such as offences associated with failing to comply with requirements outlined in legislation, regulations, or authorizations – including failure to comply with approved plans (e.g., MMV plan), failure to comply with orders, failure to pay fees etc.

Persons who fail to comply with requirements would be guilty of offences, which could result in the issuance of fines or other penalties. Fines could be increased based on the economic benefit gained by reason of the offence and directors and officers could be liable for offences committed by corporations.

Ontario's framework could also enable the province to create regulations that prohibit non-compatible activities from occurring within a given vicinity of a carbon storage project.

How should projects be closed following the completion of injection activities?

The specific operational timeframe associated with any given commercial-scale carbon storage project would depend on the scope and scale of the project and the availability of storage space within the geological formation in which carbon is being stored. When the injection of CO₂ has permanently ceased, carbon storage projects enter what is known as the closure period. If approved, Ontario's regulatory framework would need to set out the responsibilities of operators during this period.

Once operations have ceased, operators could be required to decommission and close their projects in accordance with an approved closure plan, any terms or conditions included within associated authorizations and any requirements contained in regulation.

The ministry could also require operators to obtain ministry approval before decommissioning and abandoning wells and implementing the closure plan. Once operators have completed all closure activities, the ministry could verify that the site has been closed and all applicable requirements for closure and site remediation have been met.

To help ensure the adequacy of an operator's closure activities, final reports and plans submitted by an operator would need to be prepared by a qualified professional and could be subject to an independent third-party review.

How should closed projects be monitored and maintained over the long-term?

While carbon stored within geological formations would eventually become permanently stored within surrounding minerals, this process can take hundreds to thousands of years to occur. During this time, periodic monitoring, and stewardship activities, such as the periodic re-plugging of decommissioned wells, may need to be completed to ensure that carbon remains securely stored.

An approach to consider that has been taken in some jurisdictions, is that responsibility for any decommissioned wells and CO₂ remains with the operator after a facility has been closed. Under these models, the holder of a licence or permit authorizing the storage of CO₂ would continue to be responsible for completing any ongoing monitoring and stewardship activities and managing and responding to any risks.

However, as the timeframes associated with the ongoing monitoring and maintenance of storage sites last longer than an individual corporation would exist, and so that these responsibilities do not end up being transferred to the landowner, an alternative approach taken in some jurisdictions, including the province of Alberta and several US States, allows operators to transfer the responsibility for conducting long-term monitoring and maintenance activities to government.

To help ensure carbon storage sites would continue to be appropriately monitored and maintained over the long term, the ministry could allow operators to seek ministry approval to transfer responsibility for the ongoing monitoring and maintenance of carbon storage projects to the Crown, subject to any conditions or limitations established by the ministry. This is often achieved through the issuance of a closure certificate.

While specific requirements associated with obtaining a closure certificate would need to be determined through the development of potential future regulations, proponents could be required to provide:

- A final monitoring, measurement, and verification (MMV) report demonstrating that CO₂ continues to be securely stored and is behaving in a stable and predictable manner with no significant risk of future leakage.
- An analysis of any residual risks associated with the storage site.

- A summary of any post-closure monitoring and site care activities that should be completed.
- Any additional fees required to cover costs associated with implementing the post-closure monitoring and site care plan.

The ministry could also establish a ‘closure period’ – a prescribed amount of time where the proponent would continue to monitor and care for their sites before being eligible to apply for a closure certificate. The length of the closure period being used by other jurisdictions can vary but tend to range from 10 to 50 years with some jurisdictions having the flexibility to reduce the closure period on a site-specific basis if sufficient evidence is provided to demonstrate that CO₂ is securely stored with no significant risk of future leakage.

Responsibilities that could be transferred to the government also vary by jurisdiction but often include the transfer of responsibilities associated with:

- the ongoing inspection and monitoring of storage sites for leakages or significant irregularities
- the ongoing management and care of storage sites as required (e.g., the periodic re-plugging of wells, etc.); and
- conducting any emergency management, response and remediation activities that may be required.

To help ensure that costs associated with carrying out any of these responsibilities do not become a burden to taxpayers, jurisdictions that allow operators to transfer responsibilities to government often require operators to pay stewardship fees sufficient to cover the costs associated with any responsibilities being transferred. The amount of the stewardship fees that are required to be paid are typically established on a project-specific basis based on the specific post-closure monitoring and maintenance activities and risks associated with a specific project or are based on a standard rate applicable to all projects. Stewardship fees are typically required in addition to any financial assurance provided by proponents to cover costs associated with closing and decommissioning projects and carrying out post closure monitoring and maintenance activities prior to any transfer of responsibilities.

Stewardship fees are typically collected in annual installments throughout the project’s lifecycle and are often placed within a dedicated trust specifically established by the responsible government agency to fund post-closure responsibilities being transferred. These stewardship trusts are often administered directly by government but could also be administered by a third-party trustee appointed by the minister. Both models are currently used by the ministry to manage trusts established under a range of legislative frameworks, including trusts established under the *Oil, Gas and Salt Resources Act*, *Aggregate Resources Act*, and the *Crown Forest Sustainability Act*.

What other charges and fees should proponents be required to pay?

As in most other jurisdictions where commercial-scale carbon storage projects are permitted, the costs associated with administering Ontario’s framework could be offset by fees paid by proponents.

Fees could be established at rates that would aim to cover the full cost to government associated with the delivery of the proposed framework. Regulatory fees could include any annual fees and fees for applications, amendments, transfers, etc.

Where projects would be using Crown land/resources in connection with carbon storage projects, they could also be subject to charges such as lease and/or rental payments.

How should the framework be delivered?

If approved, implementing a commercial-scale regulatory framework would require additional resources to help ensure the ministry has the technical, regulatory, scientific, and operational capacity to undertake tasks including inspections, implementing, and enforcing the regulatory framework, reviewing reporting requirements, and verifying information provided by proponents during project design, operation, closure, and post-closure decision points.

The ministry could also explore opportunities to use entities outside of the ministry to deliver certain aspects of the framework, such as using external consultants to support the ministry's review of applications and reports submitted to the ministry by proponents.

Questions for discussion

While feedback is being sought on all concepts outlined above and any other considerations that can inform the development of a commercial-scale regulatory framework, respondents are also encouraged to answer the following questions:

1. Would initially scoping the framework to only allow commercial-scale projects to store CO₂ within saline aquifers and depleted oil and gas wells in southwestern Ontario at depths of at least 800m or more meet industry's current needs and maintain public comfort in the development of these projects?
2. Would you support using a competitive process to select projects looking to store carbon dioxide on Crown land? Why or why not?
3. How should proponents obtain rights to pore space? What are the benefits and challenges associated with adopting the models currently being used in western Canada and US States discussed above?
4. Would a staged approach to authorizing carbon storage projects be desirable? If so, how should authorizations be staged?
5. When and how should potential impacts to the agricultural land base and the agri-food network (e.g., operations, infrastructure, agribusinesses, etc.) be considered?
6. How should proponents of commercial-scale geologic carbon storage projects notify and engage with Indigenous communities and other parties who may be affected by their proposed projects?
7. What operational controls should be put in place to help ensure commercial-scale carbon storage projects would be developed, operated, and decommissioned in a safe and responsible manner?
8. Would allowing proponents to transfer responsibility for the long-term monitoring and stewardship of carbon storage projects to the Crown help ensure carbon storage

projects, including the wells, geologic storage areas and carbon stored in geological formations, would be adequately cared for over the long-term?

9. Would you support components of this framework being delivered by an external entity and if so, what components?