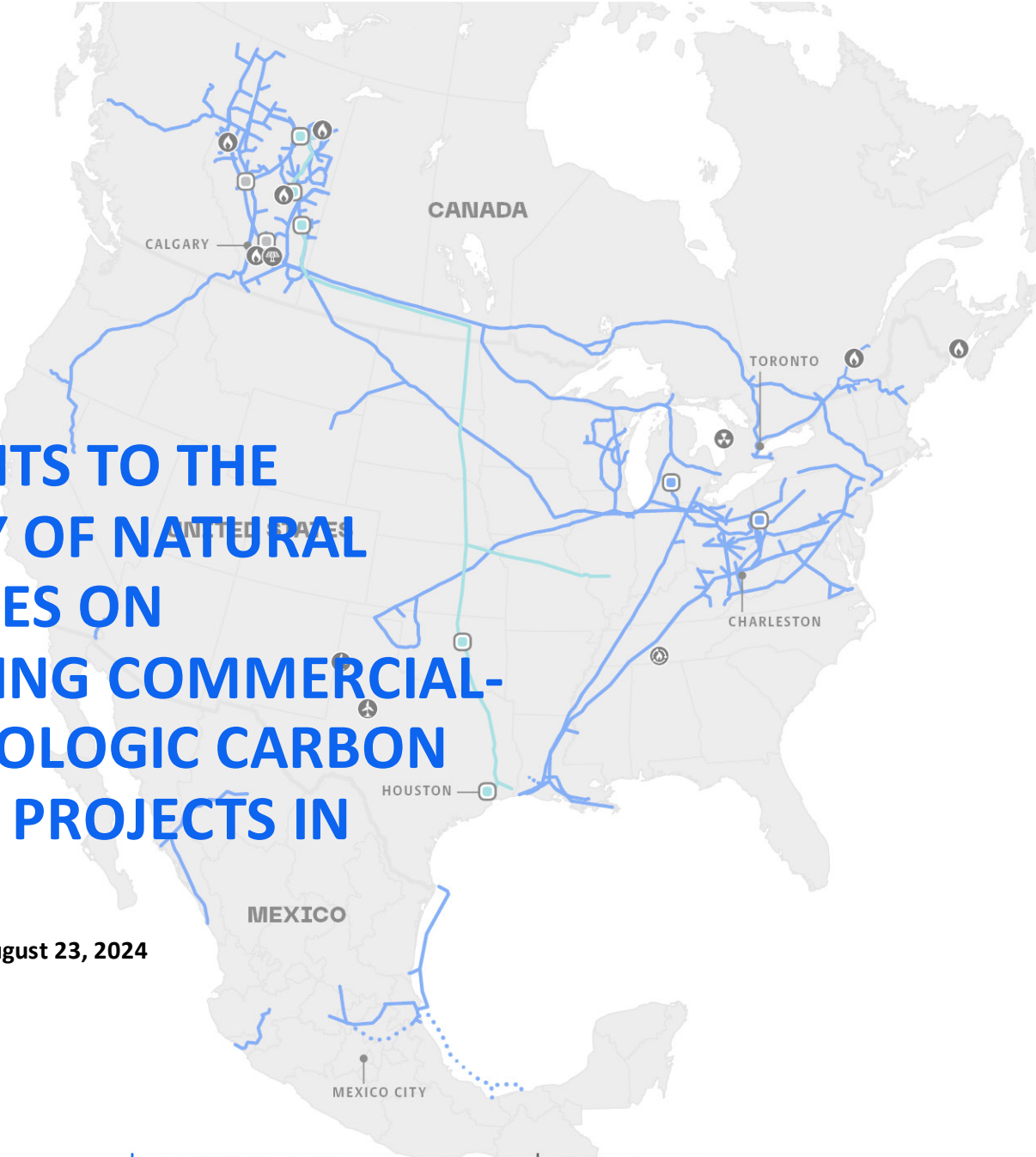

COMMENTS TO THE MINISTRY OF NATURAL RESOURCES ON REGULATING COMMERCIAL-SCALE GEOLOGIC CARBON STORAGE PROJECTS IN ONTARIO

TC Energy Submission | August 23, 2024

NATURAL GAS PIPELINES

75 %

of Canada's demand

Our 93,600-kilometre pipeline network connects the most competitive, low-cost natural gas basins to premium value markets in Canada, the U.S. and Mexico. In Canada, we have completed construction of the Coastal GasLink pipeline, enabling the first direct path between Canada and global LNG markets to deliver responsibly produced natural gas to the world.

POWER AND ENERGY SOLUTIONS

30 +

years of experience

We own or have interests in facilities that generate approximately 4,600 megawatts of power-generation capacity, over 75 per cent of which is emissions-less. To backstop the forecasted growth in renewable power generation by 2050, our strategy in Power and Energy Solutions focuses our portfolio on world-class nuclear power generation and pumped hydro opportunities, critical for maintaining grid reliability.

LIQUIDS PIPELINES

20 %

of Canadian exports to markets served

Our 4,900-kilometre liquids pipeline system directly connects one of the largest global oil reserves, the Western Canadian Sedimentary Basin, to the largest refining markets in the U.S. Midwest and Gulf Coast. In June 2024, our shareholders approved our plan to spinoff our liquids pipelines business into an independent publicly-listed company, South Bow. The separation is expected to occur in late-third quarter to mid-fourth quarter this year.

TC Energy

About TC Energy

Our vision is to be the premier energy infrastructure company in North America today and in the future. We are a team of 7,000 energy problem solvers moving, generating and storing the energy people need every day. We are willing partners in the collective effort to advance a lower-emission energy system that is affordable, reliable and secure through energy solutions including natural gas, nuclear energy and pumped hydro. Our goal is to develop, build, and safely operate a portfolio of infrastructure assets that enable us to prosper irrespective of the pace and direction of energy transition and at all points in the economic cycle.

We work closely with our neighbors, customers, Indigenous peoples and governments to build relationships, create mutually beneficial opportunities and build the energy systems of the future. Beyond our core business, we are making investments to build resilient communities, support diverse local businesses, attract and retain talented individuals, and create value alongside Indigenous peoples and groups.

At TC Energy, we recognize the importance of addressing climate change and the significant undertaking to transition to a low-carbon future. We are leveraging our existing network and our expertise to find a reasonable balance between security, affordability and sustainability as we deliver the energy society relies on.

General Comments to the Ministry of Natural Resources

TC Energy is providing comments to the Ministry of Natural Resources as part of its consultation on regulating commercial-scale geologic carbon storage projects in Ontario. We appreciate the opportunity to provide this feedback to the Ministry as it develops a legislative and regulatory framework to enable these projects and provide industries in Ontario with a critical tool for managing their emissions. An efficient regulatory framework will contribute to the achievement of Ontario's emission reduction targets. Below, please find responses to the questions presented in the Ministry's July 2024 Discussion Paper.

1. **Would initially scoping the framework to only allow commercial-scale projects to store CO_2 within saline aquifers and depleted oil and gas wells in southwestern Ontario at depths of at least 800 m or more meet industry's current needs and maintain public comfort in the development of these projects?**

TC Energy supports a phased approach to the regulatory framework and would support limiting the scope of the framework initially, but with the expectation to expand in the future as technology and knowledgebase develops. This approach should meet industry's current needs and maintain public comfort in the development of these projects.

It is important to note that while it is generally accepted that temperatures and pressures that maintains CO_2 in a supercritical phase will be present at a storage depth of 800 m or more, site specific characteristics of a prospective storage facility (i.e. actual temperature and pressure of the reservoir vs. the depth) are ultimately the deciding factors of the suitability of the location for development. An additional advantage of CO_2 storage at deeper depths is that it may result in lower probability of encountering existing well penetrations reducing the risk of potential leakage pathways. It is our view that maintaining CO_2 in a supercritical phase is essential for commercial-

scale development because it results in the ability to store significantly greater volumes of CO_2, compared to storage of CO_2 in a gaseous phase.

In addition to reservoirs site specific characteristics (depth, temperature and pressure), consideration must also be given to the storage facility's location (e.g., proximity to high density populations) and length and route of the CO_2 transportation system as transport of CO_2 in a supercritical phase will require high-pressure (to maintain its phase), or a system that will convert gaseous phase CO_2 to a supercritical state prior to injection. These elements and their associated risks, which are typical of high-pressure systems, must also be considered in the development of a regulatory framework for commercial scale CO_2 storage projects.

While limiting the scope of the framework initially is acceptable, as the technology and knowledge base of CO_2 storage evolves, appropriate adjustments to the framework should be made in a timely manner to reflect the most current information.

2. Would you support using a competitive process to select projects looking to store carbon dioxide on Crown land? Why or why not?

TC Energy agrees that the process for awarding projects looking to store CO_2 on Crown Land should be competitive for the following reasons:

- There are many ways to develop projects and different developers may consider and/or prioritize aspects of development that may not have been considered by the Crown.
- It promotes innovation and cost efficiency in project development.
- It allows developers to convey their plans for development and maintain a level of accountability to following through on their plans (i.e. say what they are going to do – and do it).
- It provides the Crown with insight into hot spots or areas that multiple developers are interested in developing/evaluating.
- It allows the Crown to understand the value of the pore space.
- It allows the Crown to establish key criteria that must be met, supporting the Province's objectives and goals for delivering sequestration facilities.

TC Energy suggests that the competitive selection process should be for open access via a service provider (the storage hub model) rather than the standalone project model for single emitters. A single project intending to store its own emissions would give that developer an undue competitive advantage by potentially preventing other emitters access to that pore space. In line with Alberta's approach, Ontario should place requirements on the sequestration agreement holder that ensure that the management and development of the hub is an efficient use of pore space, ensures open access to affordable use of the hub where appropriate and provide just and reasonable cost recovery to the agreement holder.

Given the limited amount and quality of potential sequestration pore space in the province, if Ontario were to contemplate a a hybrid approach between the storage hub model and standalone project model, this should be done in consultation with both emitters and potential sequestration providers to ensure that appropriate standards were established to confirm fair treatment and affordability for sequestration services. Considerations for a hybrid model could include CO_2 volume thresholds, density of emissions within a sequestration region, etc.

Once awarded, there should be a clearly defined process for adaptation to site boundaries as a developer's understanding of subsurface conditions/risks matures during the various stages of exploration and development, and defined timelines for development (including consideration of acceptable reasons for time extensions).

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?

TC Energy supports the acquisition of rights to pore space from the Crown, rather than from individual landowners, as this would be the most efficient process. Individual landowners would still be engaged through the land rights process, and other applicable stakeholders and rightsholders would be engaged through the consultation and general engagement processes, as required and applicable. In addition to this efficiency, having the Crown regulate access to pore space provides a mechanism for the regulator to provide oversight over the potential interaction of multiple projects injecting into the same reservoir (e.g. potential for pressure interference or cumulative effects).

We suggest that rights to pore space should be obtained through a competitive process where proponents must provide:

- Financial means to undertake appraisal programs and subsequent development of associated infrastructure;
- Commitments to advancing development and commercial activities within a specific timeline;
- Ability and willingness to provide open access service to CO_2 emitters, outside of their own emissions (if a hybrid option is considered);
- Demonstrate capabilities and experience developing subsurface projects;
- An evaluation of the potential impacts of the project on the environment, stakeholders and rightsholders; and
- A potential post-closure plan.

The process developed for acquiring rights to pore space should give the proponent certainty of the ability and requirements to transition from project evaluation to commercial scale development. It should also consider the protection of commercially sensitive information and respect the proprietary nature and confidentiality of the information submitted. This confidentiality should be maintained throughout the life of the project.

Each jurisdiction has unique pore space ownership provisions. For example, in Western Canada, the Crown owns the pore space. In North Dakota, Wyoming and Louisiana, legislative and regulatory decisions are well advanced on ownership rights. The benefits and challenges of vesting all pore space and leasing rights to proponents are highlighted below. Regardless of the approach, clarity in regulation is needed to prevent ambiguity and provide certainty to proponents.

<u>Benefits</u>

- Certainty granted to project applicants or operators regarding the pore space boundaries of the storage facility.
- Establishes a single counterparty for agreements between developer and owner of pore space.
- Provides clarity in ownership and rights of the minerals (delineation between surface and mineral rights).
- Allows proponents to undertake pre-screening efforts to designate optimal sites for storage.

- Avoids potential over-exploration of a subsurface zone that may be targeted for various types of development.
- Provides defined timelines requiring successful proponent to advance development work and build out commercial opportunities.
- Creates competition amongst service providers to be innovative, competitive in their rates, and develop the project in a timely manner.
- Provides the government with the opportunity to control what parts of the province can be targeted for development.

Challenges

- Area available for sequestration development may be more rigid and inflexible given the potential need to shift site boundaries due to subsurface conditions/risks as understanding of subsurface development matures.
- Process for changes or shifts to boundaries is not clearly defined.
- Areas designated for exploration may not be proximal to regions with highest / concentrated CO_2 emissions.
- Proponents awarded pore space are still not guaranteed to advance due to other challenges such as commercial feasibility, environmental or regulatory permitting challenges, financing, etc.
- Duration of the Sequestration Lease Agreements (SLA) issued by the administrative body do not always align with the term length required by the CO_2 emitters, resulting in misalignment between contracts. Recommendation would be to align the SLA term duration to 20 years (or more), providing confidence to the emitter that they will be able to sequester emissions for a term length that more closely aligns with their needs for financial investment decisions.

4. Would a staged approach to authorizing carbon storage projects be desirable? If so, how should authorization be staged?

In both Western Canada and the U.S., Carbon Capture Utilization and Storage (CCUS) project development follows a staged approach. TC Energy supports this approach, because staged authorizations enable project developers to de-risk the project in phases, establishing confidence in the geological asset, building up commercial underpinning and reducing capital exposure. Further, staged authorizations allow developers the ability to pull out or discontinue project development in the event of unfavorable results (e.g., poor quality reservoir) and with minimal consequence as commitments are made only for a particular stage. Lastly, the staged approach typically aligns with project developer requirements to make FID (financial investment decision).

The authorization process in Western Canada includes the following stages: evaluation agreement, evaluation (if applicable)/injection well(s) permit, sequestration lease agreement, CO_2 injection approval, plug and abandonment/closure permit. Though clarity may be sought in individual stages, the overarching process provides a predictable path to approval, minimizes a project developer's exposure to risk, and allows them to plan for each stage accordingly.

The development of a stage approach within the regulatory framework should clearly define the path from initial evaluation as a special project to commercial-scale development, providing a developer with certainty that their

initial investment into the exploration of an opportunity can translate into a commercial scale development once the opportunity is proven.

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?

Potential impacts to the agricultural land base and the agri-food network, as with all potential impacts from a project, should be considered throughout development, starting at the screening/ evaluation stage. The extent of impact will vary depending on the stage of project (e.g. an exploration well will have a different impact than pursuing development of a commercial scale project), and these differences should be acknowledged as the project progresses.

As with all projects, CCUS projects should be subject to applicable existing Federal and Provincial/State regulations. For example, in Western Canada, there are considerations to minimum setbacks of surface facilities (e.g. a well) from watercourses/waterbodies, including domestic use aquifers, to ensure no or minimal impact. In the U.S., there is protection of Underground Source of Drinking Water (USDW) by inhibiting any type of injection into a USDW and providing assurance that injection is within formation(s) that are not hydrologically connected to a USDW. Regardless of the type of project being developed, these requirements or considerations still apply.

Specific to CCUS, comprehensive monitoring programs such as the Measurement, Monitoring (or Reporting) and Verification (MMV or MRV) Program is required to be developed for all CCUS projects prior to injection and are continually updated with information obtained during injection. These programs focus on how an operator will provide proof of CO_2 containment and conformance to what was planned (i.e., verify that the modeled CO_2 plume growth follows actual plume growth) during the injection period and beyond. The type and cadence of monitoring is proposed within the program, but then may be scaled (e.g., increased frequency) based on operational data.

6. How should proponents of commercial-scale geological carbon storage projects notify and engage with Indigenous communities and other parties who may be affected by their proposed projects?

Best practices agree that early and ongoing engagement is necessary to build long-term, constructive relationships between project proponents and Indigenous groups and other parties who may be affected by a proposed project, and commercial-scale geological carbon storage projects should be no different.

TC Energy notes that to be effective, any requirements regarding notification and engagement with Indigenous communities and other parties who may be affected by a proposed project must be flexible to allow for project-specific engagement to be developed and adapted commensurate with the nature, location, scale, scope and potential effects of the project, and to the identified interests, information needs, and degree of concern expressed. As such, notification and engagement should be conducted, as appropriate, for each permit authorization required for a project by the proponent proposing the development.

We suggest that focusing the responsibility of notification and engagement on the project developer would reduce risks of consultation fatigue and confusion which otherwise could arise if each individual emitter seeking to store CO_2 within a carbon storage hub were required to engage. In addition, to build public knowledge and understanding of commercial scale geologic carbon storage, we suggest that the Government develop information

materials and resources that can be made available by government to support the education of Indigenous groups and interested parties and by proponents during their engagement efforts. This will increase the level of awareness of these types of projects and ensure that proponents are sharing consistent information.

The extent of engagement carried out in advance of each authorization should also depend on the specifics of a project scope and location, nature of the land and pore space rights and authorization stage/type of permit being sought and associated activities. This could range from carrying out extensive engagement activities with multiple communities and parties to a simple engagement activity such as notifying a single landowner or community. Guidance should be developed regarding detailed information required for each type of formal notification, should be relevant to the stage and provide the flexibility to account for the varying project-specific circumstances (e.g. Crown or freehold lands and rights, standalone projects or storage hubs, etc.).

In addition, guidance and requirements for engagement should ensure that it is clear that proponent engagement with Indigenous groups is separate from, but complementary to, any Crown consultation concerning potential impacts on Aboriginal and Treaty rights and may be used by the Crown to determine whether the Crown's duty to consult has been fulfilled, as applicable.

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?

Operational controls such as MMV (discussed in Q5), Post-closure plans and funding, and understanding ownership of liability during and post-injection are all operational controls that should be put in place to ensure safe and responsible development, operation and decommissioning of commercial scale carbon storage.

In Western Canada, a Post-closure plan and post closure funding are requirements within the regulatory process to receive approval for CO_2 injection. Specific regulations (directives) are also in place for decommissioning and reclamation of wells, including CO_2 injection wells.

As noted in Q3, one challenge and an important aspect that requires clarity within the regulatory framework is the role of the regulator (or entity responsible for administering pore space rights) has in managing the potential impacts of numerous operators injecting into the same reservoir, such as pressure-interference between the projects. As individual project operators have jurisdiction over their pore space, an entity with authority over all of the individual projects must play a role in providing oversight and management of regional injection operations. In the absence of this oversight and management, issues in operations surrounding the ability to inject, anticipated injection capacity, etc. may be encountered.

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, geological storage area and carbon stored in geological formations, would be adequately cared for over the long term?

TC Energy supports the concept of transferring the responsibility for long-term monitoring and stewardship of carbon storage projects to the Crown and recommends the regulatory framework should describe the appropriate triggers to transfer this responsibility.

Many jurisdictions in the U.S. have adopted or considered adopting liability transfer of a properly managed storage facility in the Post-Injection Site Care (PISC) period. This stage of the life cycle of a CO_2 sequestration project represents the most stable and low risk. A similar process exists in Western Canada.

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

TC Energy is supportive of a process that promotes regulatory fairness and efficiency. In deciding to utilize a third party to administer components of this framework, the regulatory body should ensure that the entities are impartial, and the process is transparent with clearly defined roles and responsibilities. Implementation of the regulatory framework requires significant technical analysis and regulatory oversight. Whether administered by an external entity or the regulatory body, consideration must be given to ensuring that appropriate resources (in number, technical knowledge and practical experience) are available to allow development in predictable timeframes once the framework is established. When multiple entities are involved, whether regulator or external, scopes should be clearly defined to avoid duplication and ensure review and evaluation of information is only done once, and a decision made by the appropriate entity is respected throughout the process, and not re-evaluated by others.

While an external entity could manage components of the framework, there are some components that would be considered higher risk that should remain with a regulator. These include, but are not limited to, conducting Crown consultation and issuing authorizations and permits.

Conclusion

We appreciate the opportunity to provide feedback to the Ministry as part of efforts to enable commercial-scale geologic carbon storage projects. We look forward to finding opportunities to support the province as it works to leverage this activity and welcome further engagement via the contact below as appropriate.

Chris McCluskey – Manager, Government Relations E-mail: chris_mccluskey@tcenergy.com