

Proposed Amendments to the Oil, Gas and Salt Resources Act, to Remove the Prohibition on Carbon Sequestration

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We applaud the intent of the proposed changes to the OGSR Act by removing the prohibition on geological carbon storage under section 11(1.1) of the Act. This is a modest but essential change to permit industry to sustain future activity under relevant Federal carbon pricing regulations.

We recommend that in 2023 the Government of Ontario expedite the recommended programme of research, demonstration, and development (RD&D) presented in the 2007 OMNR report on *Geological Sequestration of Carbon Dioxide*¹. This report presented a 5+ year investigation of the Cambrian sandstone of southwestern (SW) Ontario. However, its recommendations have not been adopted since its publication, despite the authority of the four coauthors, who reflected knowledge of both Ontario's petroleum geology and of Alberta's progress in geological carbon storage by 2007. The 'major elements' of the proposed RD&D programme were:

Year 1: *Science and Analysis* – Analysis of global state of knowledge through literature search, attendance at international meetings/workshops/conferences, membership/participation in MRCSP, financial contribution to ongoing research at MRCSP and access to past research, preliminary geological mapping using available data and staff, development of detailed research plan and research team, and identification of related policy, regulatory, environmental issues.

Years 2 and 3: *Research and Innovation* – Implement program of scientific study, including drilling to acquire core and water samples for analysis and testing of porosity, permeability, petrography, and geochemistry; injection tests to measure permeability and injection rates; modelling, acquisition and interpretation of regional aeromagnetic data; 2D and 3D seismic acquisition, processing and interpretation; remapping of structure, isopach and faults, and volume calculations.

Year 4: *Analysis and Recommendations* – Conduct data analysis and interpretation, write reports and provide recommendations for test injection site.

Year 5+: *Application of Knowledge* – Proceed with trial injection – this is beyond the scope of the current proposal.

¹ Carter, T., Gunter, W., Lazorek, M. and Craig, R., 2007. Geological sequestration of carbon dioxide: a technology review and analysis of opportunities in Ontario. *Climate Change Research Report-Ontario Forest Research Institute*, (CCRR-07). Ontario Ministry of Natural Resources, 1235 Queen Street East, Sault Ste. Marie, Ontario. See Next Steps, page 21.

Because Ontario's manufacturing industry – steel, cement, oil refining, chemicals, etc. – has a firm expectation of a federal carbon price of \$170/tonne CO₂ in 2030, it no longer has the luxury of 5-year plans for investigating storage locations. Recent workshops in Waterloo have exposed the deep concern that heavy industries have in meeting this carbon price irrespective of the proposed investment tax credit incentives also offered by the Federal Government². The revised North American Free Trade Act offers heavy industry located in Ontario the option of shutting down production here and relocating it to the USA, where financial incentives are much more attractive, and importing the product that they would otherwise produce and export. The potential for loss of jobs and associated tax base should not be dismissed. In this way, Ontario would experience industrial decarbonization by deindustrialization.

A Matter of Urgency

Because so little is known about the Cambrian sandstone as a potential large-scale CO₂ storage reservoir, an expedited programme of RD&D of the Cambrian sandstone is needed urgently.

This programme should follow Years 2-4 of the 2007 report reproduced on the previous page. Several privately sponsored desktop studies of the Cambrian beneath SW Ontario have been undertaken in 2022 – Year 1 in the 2007 report -- and the promising drilling locations are known. One, near Nanticoke in Haldimand County, has been approved for exploratory drilling. Three other promising areas are shown in the Figure below.

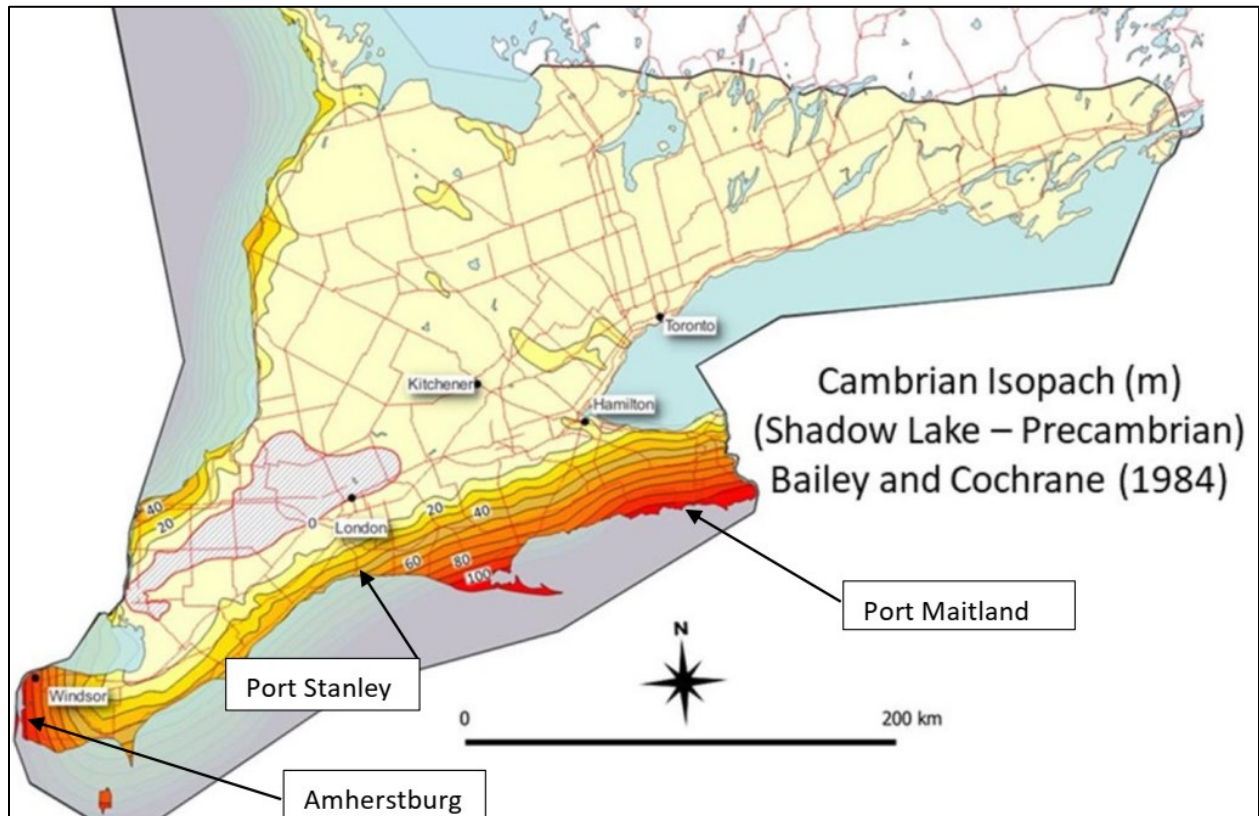
It should be appreciated that several time-consuming steps will have to be undertaken to permit geological CO₂ storage in SW Ontario by 2030, including:

1. Provision of sufficient financial incentives by the federal and provincial governments to attract capital to fund carbon capture infrastructure at emitters' facilities.
2. Enbridge³ needs approximately four years to plan and build a pipeline from emitting plant to storage site, assuming that the regulatory conditions are well established.
3. The geological investigation outlined in Years 2-4 will require about 3 years to complete – therefore early 2023 to late 2025 – and assumes that drilling rigs are reserved in early 2023 to allow drilling, coring, and in-situ testing to begin in the springtime.

Assuming at least one of the three sites is deemed suitable as a storage hub, this timeframe would permit pipeline and carbon capture infrastructure to be constructed during 2026-2029 to meet the 2030 federal deadline for 40% reduction in CO₂ emissions.

² See BMO 22 August 2022, Canada Falling Behind in CCUS Policy, Following U.S. Upgrade. It estimates that Federal incentives will cover <25% of CCS costs sanctioned by 2030 compared with over 60% of costs in the US covered by the Inflation Reduction Act. According to BMO's March 2022 analysis of the Pathways project in Alberta, the Quest project in Alberta was funded with ~70% of CAPEX and >50% OPEX costs.

³ Jeff Cadotte, Enbridge, indicated this requirement at a meeting of vulnerable industries at CMAT Hamilton, December 6, 2022.



Therefore, we recommend that the Ontario Government request proposals for the exploratory drilling of the Cambrian sandstone in these three areas. Without a clear indication of potential geological storage capacity in SW Ontario, industries will not commit to investigate carbon capture and storage even if they could raise CAPEX and OPEX using the present unattractive financial incentives. Recent meetings of Ontario’s heavy industry always come back to the issue of *“Show me the storage before I commit to CCS!”*.

For over 15 years, this issue has remained unaddressed. The government of Ontario can resolve one of these issues by funding the drilling of exploratory boreholes for testing of CO₂ storage in the areas shown above. This would advance what was proposed in 2007 and is not materially different from what the Ontario Geological Survey did in characterizing the Silurian aquifer in SW Ontario ten years ago.

The present Government of Ontario can show leadership by issuing three RFPs in early 2023 for the drilling, coring, hydraulic testing and numerical simulation of CO₂ storage in the saline Cambrian aquifer in the general vicinity of the three sites shown above. The cost for each site will be of the order of \$6 million, and a total of \$20 million would be a small down payment to

accelerate a project that has the potential to allow Ontario to get back on track and a fraction of the funding devoted by the government to the steel industry in 2022.

It should be remembered that the pioneering Quest project in Alberta was launched with \$745 million from the Government of Alberta and \$120 million from the federal government and has now stored over 7 million tonnes of CO₂ in roughly seven years. Alberta was alert to the potential for industrial decline in its oil and gas sector in 2013 when it began to develop its regulatory framework. Quest is now regarded worldwide as a stellar example of forethought and positive outcomes.

The Government of Ontario should recognize that its principal heavy industries are threatened by the economics of North American CCS projects. It needs to demonstrate a sense of urgency in this fundamental issue, just as it has devoted to electric vehicles, hydrogen generation, battery plants, etc. It should not be forgotten that steel⁴, cement & lime, and durable plastics are essential elements in the infrastructure of a green industrial economy⁵.

In addition to pursuing the steps in the Road Map for 2023, the government should create a task force to pursue CCS during 2023 that reports to the Premier's Office. Its first task would be to release RFPs for drilling and testing of sites for geological CO₂ storage so that the work itself could be started in early 2023. Should the Government of Ontario fail to act in an urgent manner on geological CO₂ storage, it must accept that it risks decarbonization by deindustrialization.

⁴ The average wind turbine requires 140 tonnes of steel, presentation by Bilal Sheikh, ArcelorMittal Dofasco at the Hard to Abate Club workshop, University of Waterloo, November 2022. Such a wind turbine also requires 2-4 tonnes of copper and nearly 2 tonnes of rare earths permanent magnets.

⁵ Gross, S., 2021, *The Challenge of Decarbonizing Heavy Industry*. Brookings Institution, Washington D.C., USA.