

Request for Proposals



Onshore Nova Scotia Subsurface Energy Storage Assessment and Gap Analysis

RFP Release Date: Tuesday, February 6, 2024

Proposal Due Date: Tuesday, March 5, 2024, at 1:00 PM AST

Contact:

Tim Bachiu, Director - Research
tbachiu@netzeroatlantic.ca



Executive Summary

Net Zero Atlantic on behalf of Nova Scotia Department of Natural Resources and Renewables is requesting proposals for completion of an assessment and gap analysis of the subsurface energy storage potential of Onshore Nova Scotia.

Primary goals for proposals to meet include:

Goal 1 – Compiling existing geoscience data relevant to subsurface energy storage including porosity, permeability, and fluid pressures, and assessing suitability for potentially storing energy products like hydrogen, carbon dioxide, compressed air and natural gas in candidate reservoirs.

Goal 2 – Evaluating subsurface energy storage in other jurisdictions and highlighting analogs and lessons learned that are relevant to Nova Scotia opportunities.

Goal 3 – Identifying data gaps and knowledge gaps for Nova Scotia’s onshore energy storage opportunities and recommending technical next steps for further de-risking of the resource potential.

1. Introduction

[Net Zero Atlantic \(NZA\)](#) is a leading independent, not-for-profit research organization advancing Atlantic Canada’s transition to a low-carbon future. One of NZA’s approaches to realizing this future is to identify knowledge gaps, secure funds for new studies aimed at reducing risk and encouraging the sustainable development of Atlantic Canada’s energy resources and build the team to deliver credible and unbiased data to aid in defining the pathways forward.

This request for proposals (**RFP**) is issued by NZA on behalf of the Subsurface Energy Development Division of Nova Scotia’s Department of Natural Resources and Renewables (**NRR**). This work supports the Province’s energy policy objectives related to climate change, inclusive economic growth and sustainable development.

Subsurface onshore energy storage is expected to play a role in Nova Scotia’s ongoing transition to a net zero emissions future. Currently, there is a lack of detailed, readily accessible information regarding the location, extent, and geological characteristics of potential subsurface energy storage sites for transitional energy sources such as hydrogen, compressed air, natural gas, and CO₂. In addition, there is no clear path outlining the steps needed to make the most of the energy storage opportunities in Nova Scotia. The project requested in this RFP is intended to address these two broad knowledge gaps.

2. Objectives

NRR’s Subsurface Energy Development (**SED**) Division is seeking geological and related information regarding the opportunity for subsurface energy storage and the suitability of the province’s geological reservoirs for this purpose. The information will be used by NRR and others to inform the strategic planning and resourcing decisions needed to advance these opportunities in Nova Scotia.

While much of the raw data for this project will be provided by SED, this material must be compiled, the storage opportunity assessed and compared to analogues elsewhere in the world, and the study outcomes reported.

The primary outcomes of this work include:

- An assessment of the suitability of the candidate geological formations in Nova Scotia for subsurface energy storage.
- Identification of key learnings from subsurface energy storage development in other jurisdictions that are relevant to Nova Scotia.
- Recommendations to address data gaps and knowledge gaps identified during the study.

3. Scope of Work

The study is divided into three main tasks:

Task 1 – Subsurface energy storage suitability assessment

Task 2 – Technical Analogues Review and Comparison

Task 3 – Synthesis, Gap Analysis and Recommendations

3.1 Task 1 – Subsurface Energy Storage Assessment

Task 1 will define the areas in Nova Scotia that may be suitable for subsurface energy storage and assess the suitability for development using publicly available data. The extent of the study area (**Figure 1**) includes onshore and nearshore¹ Nova Scotia with the focus on the resources accessible from onshore. The nearshore is included in the study area to allow for the use of geologic data collected from the nearshore that is relevant to the assessment of onshore geological conditions. The assessment excludes resources that would require direct disturbance of the seabed during development. The study area is underlain by Paleozoic and older basement, sub-basins of the Devono-Carboniferous Maritimes Basin, and the Triassic-Jurassic Bay of Fundy.

1

Nearshore is defined as the area within approximately 35 km of coast of Nova Scotia and within the jurisdictional boundaries of the CNSOPB and province of Nova Scotia as shown on Figure 1. The 35 km area was created with a buffer around NS coastlines and simplifying the output. The simplified buffer is extended in the east to intersect the CNSOPB jurisdictional boundary. Sources for the area of interest polygon can be provided on request.

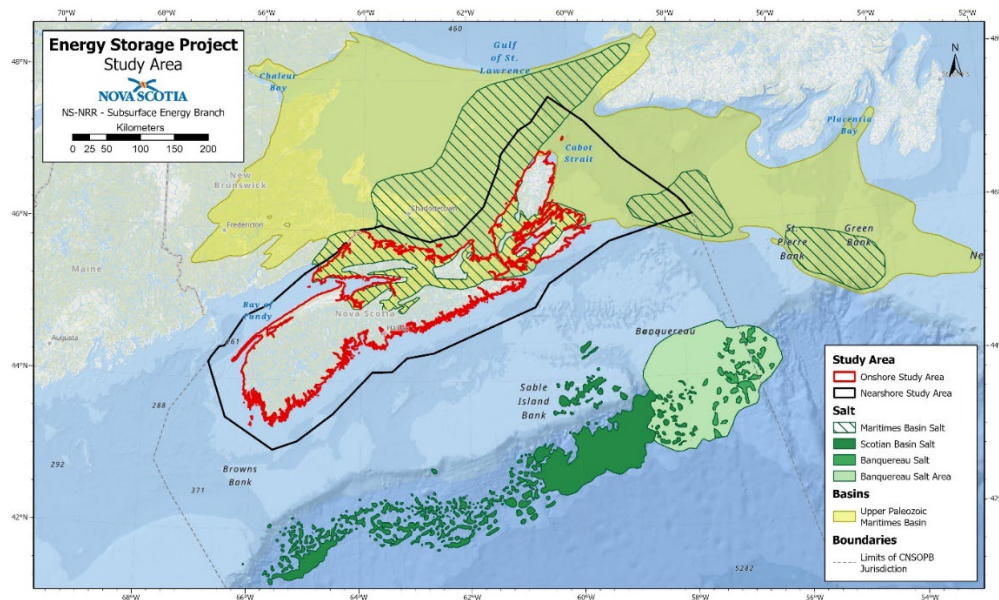


Figure 1 - Request for Proposals Study Area covering onshore and nearshore areas of the Province of Nova Scotia. Scotian basin and Banquereau salt locations after Deptuck and Kendell (2012), Upper Paleozoic Maritimes Basin extent and salt modified from Dietrich et al. (2011).

Subtasks include:

- 1.1 **Data Compilation and Literature Review:** A data synthesis and compilation of publicly available geological data related to subsurface storage in Nova Scotia's onshore and nearshore. A preliminary list with links to potentially relevant data, documents, and sources is provided in **Schedule 1** of this RFP. The successful proponent will be expected to supplement the provided sources through an independent literature review and independent geographic and geological map and database review.
- 1.2 **Storage Assessment:** The information compiled in Subtask 1.1 will be used to identify the areas where subsurface energy storage is feasible in Nova Scotia for the different gases or liquids that could be stored. The assessment will include storage assessment grouped by rock type as listed below. Relevant subsurface storage parameters such as porosity, permeability, and fluid pressure will be summarized, synthesized, and integrated in the storage assessment. Where geographic considerations are relevant, rock types can be combined or sub-divided by geography where it provides clarity to the resource assessment exercise.
 - Soft Rock opportunities
 - Storage in salt
 - Storage in sandstone
 - Storage in limestone
 - Storage in caverns and abandoned mines

- Hard Rock opportunities
 - Storage in plutons and volcanics
 - Storage in metamorphosed sedimentary basement.

Each of the different rock types will have features that contribute to the suitability and risks of storage of energy products. As well, candidate reservoirs may need to occur in conjunction with lithological, structural, or man-made seals and traps to perform as an effective storage resource. A suitability assessment and ranking of each rock type and area is required to identify opportunities where there is the greatest potential for the development of subsurface energy storage.

The storage of energy products will be designed based on the intended fate of the products. For example, temporary storage is required for products such as hydrogen which may be stored for short durations following production and retrieved for use or transportation. The suitability of the geological conditions for temporary storage may be different than for storage that is intended to be permanent. The assessment must also address requirements to alter the subsurface prior to storage usage. For example, does resource utilization imply the man-made creation of additional void space (e.g., via desalination, mining, etc.) prior to storage. The suitability assessment of the rock types must address both temporary and permanent storage scenarios, subsurface alteration steps if any, and rank the suitability for storage of the following energy products:

- a) Hydrogen
- b) CO₂
- c) Compressed air
- d) Natural gas

The Respondents' approach to undertaking the suitability analysis must be described in the proposal. At a minimum the assessment must consider the following factors:

- Usable capacity of the geological resource for energy storage including:
 - Void space
 1. Estimates of rock volume
 2. Assumptions of pore space or cavern space
 3. Subsurface alterations required prior to void space utilization, if any
 - Containment potential
 1. Assessment of trapping potential (physical, fluid pressures, etc.)
 2. Assessment of seal potential
 - Temporary storage efficiency:
 1. Capacity
 2. Recovery factors
 - Chemical compatibility
 1. Potential for fluid-host chemical reactions that impact storage utilization

- Geo-logistical factors relevant to geological resource development and utilization:
 - Safety risks.
 - Access to existing infrastructure/ease of development.

Task 2 – Technical Analogues

Subsurface energy product storage is being developed and analyzed in other geographies and jurisdictions and the lessons learned from these areas will be helpful in the assessment and advancement in Nova Scotia. Task 2 will describe energy storage analogues in other jurisdictions. This task will outline what reviewed jurisdictions have done and are doing to de-risk or otherwise advance the sector. Review will include, for example, past and ongoing technical studies, stakeholder outreach and regulatory changes.

Subtasks include:

- 2.1 Compilation of subsurface energy storage globally and Identification of a minimum of 5 subsurface energy product storage areas outside of Nova Scotia that can provide analogous or useful comparisons for Nova Scotia development. The linkage between these areas and Nova Scotia can be in the form of geological conditions or stages of development.
- 2.2 Comparison to regional, national, and global opportunities (as applicable) with a description of the scale and nature of the economic opportunities available in these jurisdictions.
- 2.3 Description of the supporting or limiting factors, including regulation, that promote or hinder development of these opportunities in other jurisdictions.
- 2.4 Description of the typical standards of practice used for exploration to de-risk the opportunity, subsequent reservoir/energy storage development and related public consultation.

In the proposal, Respondents are asked to provide examples of jurisdictional areas that will be compared and explain why they are relevant to Nova Scotia

Task 3 – Synthesis, Gap Analysis and Roadmap Recommendations

Task 3 will synthesize learnings from Tasks 1 and 2 to identify critical gaps in the provincial knowledge base regarding energy storage, prioritize these data and knowledge gaps, then make recommendations to address them in a systematic manner.

Subtasks include:

- 3.1 Assessment of the relative readiness of Nova Scotia for subsurface energy storage development in terms of:
 - a. regulatory regime
 - b. geological knowledge
 - c. infrastructure availability

- 3.2 Gap analysis: building on 3.1 and the outcomes of Task 2, this task will include recommendations for further data or studies to de-risk the geological opportunities, prioritization of recommended studies over the short, medium and long term, and guidance for implementing next steps for geoscience or supporting programs to address the gaps (energy storage roadmap in Nova Scotia).

4. Deliverables

Project deliverables include an Atlas, a technical report, and at least two PowerPoint presentations over the course of the project. In detail, the deliverables include:

1. An Atlas of subsurface energy storage potential and suitability ranking in onshore and nearshore Nova Scotia.
 - a. The Atlas will be provided as set of GIS files and maps that includes at a minimum:
 1. Base and derived maps used in the analysis.
 2. Identification of geographic and geologic areas suitable for each type of storage reservoir and/or stored energy product.
 3. A suitability ranking for each type of storage reservoir and energy product based on the geological conditions and assessment factors described in Section 1.3.
2. A technical report defining methods used for data compilation and suitability analysis and including sections on:
 - a. Summary of the data compilation and literature review.
 - b. Description of methods and assumptions used to develop the Atlas.
 - c. Summary of the suitability for subsurface energy storage in Nova Scotia.
 - d. Summary of the risks associated with the subsurface storage of each energy product.
 - e. A comparison of Nova Scotia geological reservoirs to other countries and jurisdictions.
 - f. Identification of geological data gaps related to subsurface energy storage in Nova Scotia.
 - g. Prioritized data gaps and recommendations (the roadmap) to further de-risk energy storage development in Nova Scotia.

The proponent will provide:

1. An interim presentation of initial results, at the approximate mid-project mark, to the NZA/NRR review committee. The purpose of the presentation is to provide an opportunity for the committee to view initial results and discuss next steps with the proponent.

2. At project end, a draft Atlas and technical report for review by the committee. Presentation of the draft report to the committee is mandatory.
3. A final Atlas and technical report incorporating comments received from the committee.

5. Timelines

The proponent is requested to host the kickoff meeting and subsequent project status meetings and presentations via video conference. The following timeline outlines NZA's current expectations with respect to timing.

RFP release date:	February 6, 2024
Proposal due date:	March 5, 2024 (1 pm AST)
Project start date:	March 22, 2024
Project completion date:	October 1, 2024

6. Funding and Contracting

Funding available for this project is capped at a maximum of CAN \$110,000 excluding taxes. Please note that NZA reserves the right not to proceed with project award. The successful proponent will be required to enter into an agreement with NZA utilizing the NZA contract. The proposal submitted by the successful proponent will form part of the contractual obligations and will be incorporated into the contract details. Any assumptions or exclusions utilized in the development of the proposal and associated budget need to be clearly defined in the proposal.

7. Proposal Requirements

1. The proposal should be concisely worded with clearly described objectives, methods, budget, schedule, and deliverables. Maximum 12 pages excluding appendices, title page, and cover letter. Please assemble all components into a single PDF document.
2. The proposal should include a brief description of the Respondent's organization and its relevant experience with similar projects. The Respondent must also describe the relevant work experience of the key staff assigned to this project and their roles on the project. This material should be summarized in the body of the proposal.
3. Provide a project organizational chart showing the roles and reporting hierarchy of staff and project partners, and reporting lines to the NZA review committee.

4. As a minimum, the study team must include a person licensed to practice geoscience in Nova Scotia. Proof of licensing is not needed for the proposal, but will be a condition requiring confirmation prior to contract signing.
5. Project budget including level of effort allocation for tasks and subtasks. Project staff and corresponding charge out rates must be included in the project budget. If the budget includes any expenses other than professional fees, the expenses are required to be defined within the budget.
6. A single electronic document is sufficient – hard copies are not needed. Please ensure the proposal is signed by an officer or equivalent with authority to bind the Respondent to the statements made in the proposal.
7. The electronic copy should be uploaded in PDF format to the NZA FTP site at <https://netzeroatlantic.sharefile.com/r-r384b5ce519d94271b237e2fa363b1a15> . The file name should include the Respondent’s company name. Please note: Your file upload is completed successfully when a green highlighted “uploaded” status marker appears by the file size. You may exit the web page at this time. An automated confirmation will be emailed and a member of the NZA team will further confirm by email shortly after your upload has been received and reviewed as complete.

8. Questions and Clarifications

NZA will accept questions from interested Respondents on an ongoing basis until 5 pm AST, Wednesday February 28, 2024. Querents will receive a direct email response from NZA and all questions and answers will be posted anonymously on the NZA website at <https://netzeroatlantic.ca/opportunities/request-proposals/onshore-nova-scotia-subsurface-energy-storage> . Respondents are encouraged to check the website for updates to the Q&A document. Please note the Q&A page will only be posted if content-related questions have been received.

Please submit your questions by email to tbachiu@netzeroatlantic.ca Please do not contact NRR with questions.

9. Evaluation

This project will be administered through NZA on behalf of NRR. Proposals will be reviewed by a committee consisting of NZA and NRR staff. As shown below, proposals will be quantitatively evaluated against a set of criteria.

Factor	Weight
<p>Experience and Knowledge: Qualifications, experience and capabilities of the company and delivery team; demonstration of local knowledge and information sources relevant to this study. Team organisation and scale is appropriate for this project.</p>	30%
<p>Project Plan, Approach and Methodology: Proponent demonstrates an understanding of the project service requirements and has outlined a clear and effective work plan. Proposal describes the objectives, methodology, milestones and deliverables, and a sound approach in undertaking this project. Communication format and frequency between the proponent and NZA are clearly described. Proponent describes an achievable schedule with well-defined milestones and demonstrates the ability to complete the work on or before the desired completion date.</p>	30%
<p>Proposal Presentation and Organization: The proposal includes all RFP requirements, demonstrates attention to clarity, grammar, and presentation.</p>	20%
<p>Value: The project will offer good value for the proposed budget. The budget is clear, convincing, and well-described.</p>	20%
<p>Total:</p>	100%

Schedule 1 -

Preliminary compilation of data and links to data that can be provided to the successful proponent at project startup by the Nova Scotia Department of Natural Resources and Renewables to support the Nova Scotia Onshore Energy Atlas and Roadmap project.

General Description

Data availability in the onshore and nearshore of Nova Scotia held at NRR is extensive. NRR has over 7,476 km of 2D data and more than 167 km² of 3D data. Coupled with 153 oil and gas wells and associated petrophysical logs, as well as production, injection and core data NRR has all the information for a comprehensive approach to mapping and dynamic (i.e. plume) modeling the opportunity for storage of CO₂ as well as hydrogen, air and natural gas locally and regionally within our basins.

Start-Up list and links to relevant data, documents, and sources

Startup listing of links to relevant digital data repositories and resources:

- Geoscience Atlas ([Interactive web-map](#))
 - [Geological Map of the Province of Nova Scotia](#)
 - [Surficial Geology Map of the Province of Nova Scotia](#)
 - [Nova Scotia Mineral Occurrence Database](#)
 - [Nova Scotia Drillhole Database](#)
 - [Nova Scotia Abandoned Mine Openings Database](#)
 - [Nova Scotia Mineral Rights Database](#)
 - [Grids for Mineral Claims, Mining Tracts and Petroleum Reservations](#)
 - [Nova Scotia Coal Seams and Underground Coal Mine Workings](#)
- Geophysics datasets
 - Airborne Magnetism Images
 - [First Derivative](#)
 - Second Derivative
 - [Detailed Scale \(>1:100 000\)](#)
 - [Regional Scale \(<1:100 000\)](#)
 - [Total Field - Digital Products](#)
 - Airborne VLF-EM Images
 - [Total Field](#)
 - [Quadrature](#)
 - [Airborne Gamma Ray Spectrometric Survey Images](#)
 - Gravity Images
 - [Bouguer Gravity Anomaly Map of Nova Scotia](#)
 - [Bouguer Gravity Images](#)
 - [Residual Bouguer Gravity Images](#)
 - [Nova Scotia Gravity Database](#)
 - [Radar Images](#)

References

Carbonates

- Barrett, A. M., 2003. Limestone, Marble, MacDonalds Lake, Inverness County, Nova Scotia. Report on Prospecting [An Assessment Report on White Carbonate Units in the George River Series of MacDonald Lake, Cape Breton Island for the Nova Scotia Department of Natural Resources, Exploration Licence 04829]. *Nova Scotia Department of Mines and Energy Assessment Report ME 2003-025*. https://novascotia.ca/natr/meb/data/ar/2003/ar_me_2003-025.pdf
- Boehner, R. C., 1987. Carbonate Buildups in the Early Carboniferous Windsor and Horton Groups, Nova Scotia [A Compilation]. *Nova Scotia Department of Mines and Energy, Open File Report ME 1987-010*.
- Boehner, R. C., 1988. Lithostratigraphic, Geological and Paleogeographical Setting of Carbonate Buildups in the Lower Carboniferous Windsor and Horton Groups, Nova Scotia. *Mines and Minerals Branch, Report of Activities 1987, Part B*.
- Boehner, R. C., Giles, P. S., Murray, D. A. and Ryan, R. J., 1989. 'Carbonate buildups of the Gays River Formation, Lower Carboniferous Windsor Group, Nova Scotia' in (eds.) H. H. J. Geldsetzer, N. P. James, and G. E. Tebutt, *Canadian Society of Petroleum Geologists, Memoir 13*.
https://archives.datapages.com/data/cspg_sp/data/013/013001/iii_cspgsp013iii.htm
- Cullen, M. P. (Mercator Geological Services Limited), 2003. Limestone, Marble, Glen Brook, Inverness County, Nova Scotia. Report on Drilling, and Drill Core Sampling and Chemical Analyses [Final Report on 2002 Drilling Program, MacLennan Calcium Carbonate Property Inverness County, Nova Scotia, Exploration Licences 04881 and 04893]. *Nova Scotia Department of Mines and Energy Assessment Report ME 2003-034*.
https://novascotia.ca/natr/meb/data/ar/2003/ar_me_2003-034.pdf
- Cullen, M. P. (Mercator Geological Services Limited), 2004. Limestone, Marble, Glencoe, Inverness County, Nova Scotia. Glencoe Carbonate Deposit, Report on Drill Core Re-logging and Resource Potential, Glencoe Area, Inverness County, Nova Scotia [Exploration Licences 04593, 05232]. *Nova Scotia Department of Mines and Energy Assessment Report ME 2004-117*.
https://novascotia.ca/natr/meb/data/ar/2004/ar_me_2004-117.pdf

Coal

- Calder, J. H., 1995. Coal in Nova Scotia. *Nova Scotia Department of Natural Resources Mineral Resources Branch Information Series ME 8, 1995*. <https://novascotia.ca/natr/MEB/pdf/is08.asp>

Petroleum Reservoirs

- Aston, T. R. C., 1985. Theoretical in situ strata reservoir and pore pressure calculations for material from no. 26 colliery, N.S. *Canada Centre for Mineral and Energy Technology, Energy Research Program, Coal Research Laboratories, Report 85-15(TR)*. <https://doi.org/10.4095/304786>
- Atkinson, E. A., Durling, P. W., Kublik, K., Lister, C. J., King, H. M., Kung, L. E., Jassim, Y., McCarthy, W. M., and Hayward, N., 2020. Qualitative petroleum resource assessment of the Magdalen Basin in the Gulf of St. Lawrence; Quebec, Prince Edward Island, New Brunswick, Nova Scotia, and Newfoundland and Labrador. *Geological Survey of Canada, Open File 8556*.
<https://doi.org/10.4095/321856>
- Bianco, E., 2013. Seismic interpretation of the Windsor-Kennetcook Basin. *Geological Survey of Canada, Open File 7452*. <https://doi.org/10.4095/292763>
- Bianco, E., 2017. Preliminary petroleum well log database, onshore Nova Scotia. *Nova Scotia Department of Energy Open File Report 2017-09*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>

- Bianco, E., 2017. Navigation data for 2D seismic lines, onshore Nova Scotia. *Nova Scotia Department of Energy Open File Report 2017-10*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>
- Bibby, C. and Shimeld, J., (2000). Compilation of reservoir data for sandstones of the Devonian-Permian Maritimes Basin, eastern Canada. *Geological Survey of Canada, Open File 3895*. <https://doi.org/10.4095/211514>
- Cameron, R., 2018. A geophysical, petrological and reservoir potential study of the Glass Sand marker unit and associated sandstones in the Upper Horton Group, Windsor Basin, Nova Scotia. *M.Sc. Thesis, Acadia University, Wolfville, Nova Scotia*. <https://scholar.acadiau.ca/islandora/object/theses%3A2645>
- Cen, X., 2017. Seismic interpretation in the Windsor Basin. *Nova Scotia Department of Energy Open File Report 2017-06*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>
- Cen, X., 2017. Preliminary petrophysics database, onshore Nova Scotia. *Nova Scotia Department of Energy Open File Report 2017-10*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>
- Durling, P. and Harvey, P. J., 1996. Results of seismic mapping in the St. Georges Bay area: implications for stratigraphy, structure, salt tectonism and petroleum potential. *Geological Survey of Canada, Open File 3319*. <https://doi.org/10.4095/208197>
- Dietrich, J., Lavoie, D., Hannigan, P., Pinet, N., Castonguay, S., Giles, P., and Hamblin, A., 2011. Geological setting and resource potential of conventional petroleum plays in Paleozoic basins in eastern Canada. *Bulletin of Canadian Petroleum Geology*, 59 (1), pp. 54–84. <https://doi.org/10.2113/gscpgbull.59.1.54>
- Grist, A., Ryan, R., and Zentilli, M., 1995. The Thermal Evolution and Timing of Hydrocarbon Generation in the Maritimes Basin of Eastern Canada. *Bulletin of Canadian Petroleum Geology*, 43, pp. 145-155. <https://pubs.geoscienceworld.org/cspg/bcpg/article-abstract/43/2/145/57647/The-thermal-evolution-and-timing-of-hydrocarbon?redirectedFrom=fulltext>
- Hayes, B. J. R., Dorey, K., and Longson, C., 2017. Assessment of oil and gas potential, Windsor and Cumberland basins, onshore Nova Scotia. *Nova Scotia Department of Energy Open File Report 2017-03*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>
- Howie, R. D. 1988: Petroleum Wells and Drillholes with Petroleum Significance – Onshore Nova Scotia. *NSDNR Information Series No. 10*. <https://novascotia.ca/natr/meb/data/pubs/is/is10.pdf>
- Keppie, D. F., 2017. Nova Scotia Onshore Petroleum Atlas - Executive Summary. *Nova Scotia Department of Energy Open File Report 2017-01*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>
- RPS Energy, 2013. Palynological Analysis and Correlation of wells Barney Brook-1, Camden-100, Creelman Hill-1, Devon Cheverie-1, Kennetcook-1, N-14-A and O-61-C, Onshore Nova Scotia. *Nova Scotia Department of Energy Open File Report 2017-04*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>
- Machado, G., and Fernandes, P., 2017. Cumberland Basin Lower Carboniferous Source Rock Project. *Nova Scotia Department of Energy Open File Report 2017-05*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>

- NSDOE, 2017. Schedule of 2D Seismic Data, onshore Nova Scotia. *Nova Scotia Department of Energy Open File Report 2017-07*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>
- NSDOE, 2017. Schedule of Petroleum Wells, onshore Nova Scotia. *Nova Scotia Department of Energy Open File Report 2017-08*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>
- Piper, D. J. W., Pe-Piper, G., and Ledger-Piercey, S., 2008. Geochemistry of the Lower Cretaceous Chaswood Formation, Nova Scotia, Canada: provenance and diagenesis. *Canadian Journal of Earth Sciences*, 45(10), pp. 1083-1094. <https://doi.org/10.1139/E08-055>
- Waldron, J. W. F., Giles, P. S., and Thomas, A. K., 2017. Correlation chart for Late Devonian to Permian stratified rocks of the Maritimes Basin, Atlantic Canada. *Nova Scotia Department of Energy Open File Report 2017-02*. <https://energy.novascotia.ca/onshore-atlas-version-1-2017/onshore-atlas-open-file-reports>

Salt, potash, and evaporites

- Adams, G.C., 1991. Gypsum and anhydrite resources in Nova Scotia. *Nova Scotia Department of Natural Resources Mines and Energy Branches, Economic Geology Series 91-1*. <https://novascotia.ca/natr/meb/pdf/91egs01.asp>
- Boehner, R. C., 1986. Salt and Potash Resources In Nova Scotia. *Nova Scotia Department of Natural Resources, Bulletin #5*. <https://novascotia.ca/natr/meb/pdf/bull05.asp>
- Boehner, R. C., 2001. 'Stratigraphy and structure of the Kingsville Salt Deposit, Windsor and Mabou Groups (NTS 11F/14), Inverness County, Cape Breton Island' in D. R. MacDonald (ed.) *Mining Matters for Nova Scotia, Opportunities for Economic Development, Nova Scotia Department of Natural Resources, Minerals and Energy Branch, Report ME 2001-2*. <https://novascotia.ca/natr/meb/pdf/01re02.asp>
- Carter, C. D. (Dow Chemical of Canada Limited), 1970. Salt, Port Richmond, Richmond County, Nova Scotia. Drillhole Logs. *Nova Scotia Department of Mines and Energy, Assessment Report ME 11F/11B 42-O-30(05)*. <https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F11B 42-O-30 05 433431.pdf>
- Cook, L. and Giles, P. S., 2001. 'Stratigraphy and structure of the Orangedale Salt Deposit, Windsor Group, central Cape Breton Island' in D. R. MacDonald (ed.) *Mining Matters for Nova Scotia, Opportunities for Economic Development, Nova Scotia Department of Natural Resources, Minerals and Energy Branch, Report ME 2001-2*. <https://novascotia.ca/natr/meb/pdf/01re02.asp>
- Cooper, P. (Noranda Exploration Company Limited), 1980. Potash, Ashfield, Inverness County, Nova Scotia. Report on Drilling [Report of Work, Special License 1-78. *Nova Scotia Department of Mines and Energy, Assessment Report 11F/14D 40-J-77(04)*. <https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F14D 40-J-77 04 434109.pdf>
- Cooper, P. (Noranda Exploration Company Limited), 1981. Potash, West Bay, Richmond County, Nova Scotia. Report on a Geological Compilation, a Gravity Survey and Drilling [Report of Work - Special License 3-80, Bras D'Or Lake Region, Nova Scotia]. *Nova Scotia Department of Mines and Energy, Assessment Report 11F/11D 40-O-27(01)*. <https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F11D 40-O-27 01 434216.pdf>
- Cooper, P. (Noranda Exploration Company Limited), 1982. Potash, Ashfield, Inverness County, Nova Scotia. Report on Drilling [Report of Work - Special License 1-78, Inverness Co., N.S.]. *Nova Scotia Department of Mines and Energy, Assessment Report 11F/14D 40-J-77(05)*. <https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F14D 40-J-77 05 434290.pdf>

- Giles, P. S., 2001. 'Geology of the McIntyre Lake Salt Deposit' in D. R. MacDonald (ed.) *Mining Matters for Nova Scotia, Opportunities for Economic Development*, Nova Scotia Department of Natural Resources, Minerals and Energy Branch, Report ME 2001-2.
<https://novascotia.ca/natr/meb/pdf/01re02.asp>
- Giles, P. S., 2001. 'Stratigraphy and structure of the Malagawatch Salt Deposit' in D. R. MacDonald (ed.) *Mining Matters for Nova Scotia, Opportunities for Economic Development*, Nova Scotia Department of Natural Resources, Minerals and Energy Branch, Report ME 2001-2.
<https://novascotia.ca/natr/meb/pdf/01re02.asp>
- Haenggi, W. T. (Dow Chemical of Canada Limited), and Howells, K. (Dow Chemical of Canada Limited), 1972. Salt, Port Richmond, Richmond County, Nova Scotia. Miscellaneous Memos on Rock Geochemistry and Drillhole Logs. *Nova Scotia Department of Mines and Energy, Assessment Report ME 11F/11B 42-O-30(06)*.
<https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F11B 42-O-30 06 432847.pdf>
- Howie, R. D., 1988. Geology of Upper Paleozoic evaporites in Southeastern Canada. *Geological Survey of Canada, Bulletin 380*.
https://geoscan.nrcan.gc.ca/starweb/geoscan/servlet.starweb?path=geoscan/fulle.web&search_1=R=126314
- Leahey, M. W. (Noranda Exploration Company Limited), 1979. Potash, Ashfield, Inverness County, Nova Scotia. Report on a Gravity Survey and Drilling [Report of Work, Ashfield Special License 1-78]. *Nova Scotia Department of Mines and Energy Assessment Report ME 11F/14D 40-J-77(01)*.
<https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F14D 40-J-77 01 433111.pdf>
- Noranda Exploration Company Limited and Fundy Geoservices, 1980. Potash, Ashfield, Inverness County, Nova Scotia. Report on Geology, Stratigraphy, Gravity and Aeromagnetic Data on the Ashfield Potash Prospect, and a Report on New Residual Gravity Models and Bromine Analyses of Halites from Drill Core [Review of Data on the Ashfield Potash Prospect, Inverness County, Nova Scotia]. *Nova Scotia Department of Mines and Energy, Assessment Report 11F/14D 40-J-77(03)*. <https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F14D 40-J-77 03 434014.pdf>
- René, C. (Domtar Limited), 1970. Salt, Kingsville, Inverness County, Nova Scotia. Drillhole Logs. *Nova Scotia Department of Mines and Energy, Assessment Report 11F/14B 42-J-80(02)*.
<https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F14B 42-J-80 02 434375.pdf>
- René, C. (Domtar Limited), and Rowbottom, T. E. (Domtar Limited), 1968. Salt, Kingsville, Inverness County, Nova Scotia. Report on Drilling. *Nova Scotia Department of Mines and Energy, Assessment Report 11F/14B 42-J-80(01)*.
<https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F14B 42-J-80 01 434357.pdf>
- Rowbottom, T.E., (Nova Scotia Research Foundation Corporation), 1966. Salt, St. Peters, Richmond County, Nova Scotia. Report on Ground Gravity Survey and Drilling. *Nova Scotia Department of Mines and Energy, Assessment Report ME 11F/10C 42-O-21(01)*.
<https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F10C 42-O-21 01 432849.pdf>
- Worth, J. K. (Noranda Exploration Company Limited and Fundy Geoservices), 1978. Potash, Ashfield, Inverness County, Nova Scotia. Report on Ground Gravity and Airborne Magnetic Surveys [The Ashfield Potash Prospect, Cape Breton, Nova Scotia]. *Nova Scotia Department of Mines and Energy, Assessment Report 11F/14D 40-J-77(02)*.
<https://novascotia.ca/natr/meb/data/ar/11F/AR ME 11F14D 40-J-77 02 433267.pdf>

Storage

- Domtar Chemicals Group, 1978. Proposal to the United States Department of Energy for a Strategic Petroleum Reserve Cape Breton, Nova Scotia (Vol. 1). *Nova Scotia Natural Sciences Library Catalogue*. <https://dnr.catalogue.library.ns.ca/Record/605407>
- Domtar Chemicals Group, 1978. Proposal to the United States Department of Energy for a Strategic Petroleum Reserve Cape Breton, Nova Scotia (Vol. II). *Nova Scotia Natural Sciences Library Catalogue*. <https://dnr.catalogue.library.ns.ca/Record/595667>
- Domtar Chemicals Group, 1978. Proposal to the United States Department of Energy for a Strategic Petroleum Reserve Cape Breton, Nova Scotia (Vol. III). *Nova Scotia Natural Sciences Library Catalogue*. <https://dnr.catalogue.library.ns.ca/Record/607333>
- Home Oil Company Limited, 1977. Strait of Canso Storage Project, Nova Scotia, Canada: proposal submitted to the Federal Energy Administration for inclusion of the Canso Storage Project in the Strategic Petroleum Reserve Plan. *Nova Scotia Department of Natural Resources Library*. <https://dnr.catalogue.library.ns.ca/Record/600305>
- Home Oil Company Limited, 1978. Strait of Canso Storage Project, Nova Scotia, Canada: proposal submitted to the Federal Energy Administration for inclusion of the Canso Storage Project in the Strategic Petroleum Reserve Plan: Supplemental Data Environmental Considerations. *Nova Scotia Department of Natural Resources Library*. <https://dnr.catalogue.library.ns.ca/Record/596079>
- Home Oil Company Limited, 1979. A Proposal for the Development of Crude Oil Storage Facilities at the Strait of Canso, Province of Nova Scotia, Canada: Chapter 1 - Technical Approach. *Nova Scotia Department of Natural Resources Library*. <https://dnr.catalogue.library.ns.ca/Record/606926>
- Home Oil Company Limited, 1979. A Proposal for the Development of Crude Oil Storage Facilities at the Strait of Canso, Province of Nova Scotia, Canada: Chapter II – Schedule Adequacy. *Nova Scotia Department of Natural Resources Library*. <https://dnr.catalogue.library.ns.ca/Record/595966>
- Home Oil Company Limited, 1979. A Proposal for the Development of Crude Oil Storage Facilities at the Strait of Canso, Province of Nova Scotia, Canada: Chapter III(A) - Environmental. *Nova Scotia Department of Natural Resources Library*. <https://dnr.catalogue.library.ns.ca/Record/602919>
- Home Oil Company Limited, 1979. A Proposal for the Development of Crude Oil Storage Facilities at the Strait of Canso, Province of Nova Scotia, Canada: Chapter III(B) - Real Estate and Permits. *Nova Scotia Department of Natural Resources Library*. <https://dnr.catalogue.library.ns.ca/Record/599294>
- Home Oil Company Limited, 1979. A Proposal for the Development of Crude Oil Storage Facilities at the Strait of Canso, Province of Nova Scotia, Canada: Chapter IV - Management Organization Experience. *Nova Scotia Department of Natural Resources Library*. <https://dnr.catalogue.library.ns.ca/Record/600735#details>
- Home Oil Company Limited, 1979. A Proposal for the Development of Crude Oil Storage Facilities at the Strait of Canso, Province of Nova Scotia, Canada: Chapter V – Contract-Business Proposal. *Nova Scotia Department of Natural Resources Library*. <https://dnr.catalogue.library.ns.ca/Record/604249>
- Home Oil Company Limited, 1979. Strait of Canso Storage Project: proposal submitted to the Department of Energy for inclusion of the Canso Storage Project in the Strategic Petroleum Reserve Plan: supplementary data, conceptual design study. *Nova Scotia Department of Natural Resources Library*. <https://dnr.catalogue.library.ns.ca/Record/594572>