



EPEX 2025

ENERGY PROSPECTORS' EXPO

OPI 62nd Conference and Trade Show



May 27th to 29th Best Western Lamplighter Inn & Conference Centre, London, Ontario



WHAT IS EPEX?

EPEX showcases the multifaceted strengths of Ontario's oil, natural gas, and salt industries—and how they contribute to the province's broader energy landscape. The conference also spotlights new opportunities emerging across the sector. In recent years, we've seen growing interest in compressed air energy storage (CAES), hydrogen, and carbon capture, utilization, and storage (CCUS), all of which build on Ontario's deep subsurface expertise.

These evolving uses and targets have renewed interest in key formations like the Cambrian and reinvigorated exploration in the province. After all, we're often working toward the same goals—just in different ways. That's why the OPI and OGSR Library created EPEX: to bring together everyone shaping the future of energy in Ontario.

ENERGY **P**ROSPECTORS' **EX**PO

Each one of you is an **important collaborator** in this conference and your participation highlights the multidimensionality of our energy sector in Ontario.

The EPEX logo is a tesseract, a four-dimensional shape with 24 faces, chosen to represent the complexities and multiple layers of energy production in Ontario.

EPEX is about more than prospects – it's about exploring and building a strong energy future.

Join us in the plenary session and let's start generating collaborative energy!

EPEX is built on core strengths — oil, gas, and storage.

What role should Ontario's subsurface resources play in Canada's energy future?

Ask a colleague. Compare perspectives. Let's build energy together.

Help us improve the conference for 2026 by filling out an in-person survey.





Schedule of Events

Tuesday, May 27th Golf and BBQ

Length	Time	Event	
6 hrs	10:00 AM	Golf, 18 Holes	Echo Valley Golf Club, 2738 Brigham Rd., London, ON.
~3 hrs	5:00 PM	Lagasco BBQ	2807 Woodhull Rd., London, ON.

Wednesday, May 28th

Live at the Best Western Lamplighter Inn & Conference Centre, London, Ontario

Length	Time	Event	Presenters
4 hrs	9:00 AM	Trade Show Setup	
		BLOCK 1 – HISTORY AND FUTURE	
15 min	1:15 PM	Welcome and Conference Opening	Scott Lewis, OPI Chairman
30 min	1:30	Lost and Found: Rediscovering Legacy Well Construction Methods	Christina Sydorko, Oil Museum of Canada
15 min	2:00	Using Historical Data Sets to Uncover Legacy Oil and Gas Wells in Ontar	Matt Dupont, Brian Chan; OGSR Library
15 min	2:15	Showcasing Geology Models in 3D Prints	Jordan Clark, OGSR Library
30 min	2:30	CO2 Sequestration in Ontario – Status in 2025	Maurice Dusseault, Richard Jackson; University of Waterloo
2.5 hrs	3:00	Networking Exploration Event	Conference Attendees
90 min	5:30 PM	Networking Dinner	Conference Attendees

Thursday, May 29th

Live at the Best Western Lamplighter Inn & Conference Centre, London, Ontario

Length	Time	Event	Presenters		
30 min	7:30 AM	Welcome Breakfast			
		Exhibit Hall Opens	Trade Show Exhibitors		
		INDUSTRY PLENARY			
45 min	8:05	Plenary Panel Discussion	Members and Friends of OPI		
		BLOCK 2 – SAFETY, SCIENCE A	ND EDUCATION		
25 min	8:50	The Wheatley Gas Explosion Site Investigation	Duncan Hamilton, Great Lakes Geoscience Ltd.		
15 min	9:15	Ontario's Unique Challenges in Identifying the Source of Leaking Gas Wells	Stew Hamilton, Montrose Environmental		
15 min	9:30	A 3D geological– hydrogeological framework for southern Ontario	Hazen Russell, Geological Survey of Canada		
15 min	9:45	How do we efficiently integrate geological 3D models into university education to acquire the knowledge and skills for career-ready Geoscientists and Engineers?	John Johnston, University of Waterloo		
60 min	10:00	Networking Break and Coffee	Trade Show Exhibitors		
		BLOCK 3 – STORAGE AND R	BLOCK 3 – STORAGE AND RESERVOIRS		
15 min	11:00	Navigating Ontario's Regulatory Hurdles: Strategies and Insights	Peter Budd, Bedrock Energy		
15 min	11:15	The Evolution and Devolution of Unregulated Storage in Ontario	Peter Johnston, HPJ Geological Engineering Ontario (HPJ GEO) Inc.		
15 min	11:30	Property: The Right to Extract vs. the Right to Store	Dan Silber, Elexco Group		
15 min	11:45	Helium exploration east of the Mississippi River, North America	Steven Tedesco, Running Foxes Energy Inc.		
90 min	12:00 PM	Networking Luncheon	Trade Show Exhibitors		
		Luncheon Keynote			
	12:45	Barbara Ellard, Director Resource & System Adequacy, IESO: Enabling Success for a Shared Energy Future			
		CORE WORKSHOP – CAMBRIAN PORE SPACE			

	1:30	Cambrian subsurface of	Allan Phillips, Clinton-Medina Group;
45 min		southwestern Ontario:	Frank Brunton, Ontario Geological
		competition for pore space	Survey, Ministry of Mines
15 min	2:15	Networking Break and Coffee	Trade Show Exhibitors
		BLOCK 4 – CAMBRIAN AND CO	2 SEQUESTRATION
	3:25	Innovative Drilling and	Jacob Wright, Jason Dodd;
1E min		Assessment Techniques for	Weatherford
15 11111		Carbon Capture and	
		Underground Storage	
20 min	3:40	Carbon Capture and Storage in	Bruce Hart, Western University and
20 11111		Southwestern Ontario	NRCan
1E min	4:00	Key Geotechnical Lab Tests for	Ming Liu, Big Guns Energy Service
13 11111		Underground CO ₂ Storage	
	4:15	Commercializing CCUS – Lessons	Philip R. Walsh, TMU Center for
15 min		learned from the U.K.	Urban Energy
		Experience	
5 min	4:30	Closing Remarks / Trade	
		Show Closed	
	5:00 PM	Trade Show Closed	Thank You for Attending! Submit your post-conference survey to help us build EPEX 2026!

Table of Contents

WHAT IS EPEX?	i
Schedule of Events	ii
Venue Map	1
Thank You Sponsors!	2
Thank You Exhibitors!	3
Welcome Messages	4
Keynote Speaker	6
Speaker Biographies and Abstracts	7
BLOCK 1 – HISTORY AND FUTURE	7
Christina Sydorko	7
Matt Dupont & Brian Chan	9
Jordan Clark	11
Maurice Dusseault & Richard Jackson	13
BLOCK 2 – SAFETY, SCIENCE AND EDUCATION	15
Duncan Hamilton	15
Stew Hamilton	17
Hazen Russell	19
John Johnston	21
BLOCK 3 – STORAGE AND RESERVOIRS	23
Peter Budd	23
Peter Johnston	25
Dan Silber	27
Steven Tedesco	29
CORE WORKSHOP – CAMBRIAN PORE SPACE	31
BLOCK 4 – CAMBRIAN AND CO ₂ SEQUESTRATION	35
Jacob Wright	35
Bruce Hart	37
Ming Liu	
Philip R. Walsh	41
Exhibitors	43
EPEX & OPI Gold Volume Archives	58
Acknowledgements	59



Venue Map

Best Western Plus Lamplighter Inn & Conference Centre

Crystal Ballroom North – Will host the Trade Show Exhibitors, Networking, Block 1, and Keynotes.

Crystal Ballroom South – Will host the Plenary, Speaker Blocks 2 to 4, and Core Workshop.





Thank You Sponsors!

PLATINUM

Bedrock Energy Corp.

Lagasco Inc.

Oil, Gas & Salt Resources Library

GOLD

Baker Hughes

Double B Well Services

Elexco Land Services Ltd.

SILVER

American Refining Group

Harold Marcus Limited

LimeGreen Equipment Rental

BRONZE

Barnes Oil Company

Jim McIntosh Petroleum Engineering Ltd.

Stream-Flo Industries Ltd.

Wellmaster Pipe & Supply



Thank You Exhibitors!

Baker Hughes Big Guns Energy Services Inc. Double B Well Services Elexco Land Services, Ltd. Lee Specialty Seals Inc. LimeGREEN Equipment Inc. Ministry of Natural Resources and Forestry Oil Museum of Canada Oil, Gas & Salt Resources Library Pembina Profire Energy Inc. Securo Vision Stream-Flo Industries Ltd. Weatherford Canada Limited Wellmaster Pipe & Supply





Ontario Petroleum Institute Inc.

555 Southdale Road East, Suite 203 London, Ontario N6E 1A2 ● Telephone (519) 680-1620 <u>opi@ontariopetroleuminstitute.com</u> ● <u>www.ontariopetroleuminstitute.com</u>

Welcome Messages

OPI Chairman's Welcome

It is my pleasure to extend a warm welcome to all attendees and guests, to EPEX 2025 This year the OPI is excited to present its 62nd Conference and Trade show which has been supporting collaboration and innovation in the oil and gas sector for over 60 years and more recently through the EPEX format broadening participation to all Paleozoic subsurface ideas and activities.

Thank you to all continuing and first-time participants in this year's conference including:

sponsors, presenters, exhibitors, and volunteers.

My appreciation and thanks to the OPI Conference Committee chair Peter Budd and to Lorraine Fillmore for their work in organizing the Conference.

On behalf of the OPI, I would also like to extend my gratitude to the Oil Gas and Salt Resources library staff including Jordan Clark, Matt Dupont, and Connor MacLeod for their support in the planning and execution of this year's conference.

We hope you enjoy EPEX 2025.

Thank you for attending,

Scott Lewis, Chairman

Ontario Petroleum Institute



Conference Chair's Message

It is my pleasure to welcome all of our conference attendees to this year's EPEX. Thank you for joining in whether for learning or teaching as we are here primarily to elevate our game and reacquaint.

Our conference agenda this year is set to explore and cover off some of the new and potential opportunities, which Ontario's newly elected government is pursuing, proposing or approving. Whether in the form of proposed new legislation for Carbon Capture & Storage, or other updated regulations for important but more mundane matters, we will hear from experts in the field who will shed light on the anticipated pathways, avoidable pitfalls and best industry practices. Technology knows no way of slowing down, so expect to hear our speaker's thoughts on new techniques for adaptation, which help keep us close and competitive.

Fresh off both elections, we find ourselves in the unusual position during this conference of speculating as to what a new federal government, with its new leadership, will bestow upon our industry whether from a taxation, incentive and conventional industry point of view. Let's engage and share our thoughts. Our keynote speaker, Ms. Barabara Ellard from the Independent Electricity Operator, will shed light on what the provincial grid operator may expect from our membership as the renewable energy transition evolves with the power market renewal Ontario has just introduced after nine years of development. Be sure to be ready with your questions!

Our Conference Committee members Peter Budd, Jordan Clark, Niki Clarke, Matt Dupont, Lorraine Fillmore, Scott Lewis, Connor MacLeod, Jug Manocha and Rhys Paterson have worked hard to ensure that several key topics are explored by and with our invited speakers, but also that we leave the conference with fresh perspectives on those topic areas. Thank you, Committee members for your thoughtful insights and dedication.

I hope you engage and enjoy our EPEX 2025 conference this year.

Thank you for coming!

Peter Budd

Conference Chair



Keynote Speaker

Barbara Ellard, Director of Resource and System Adequacy, Independent Electricity System Operator (IESO)

Enabling Success for a Shared Energy Future

By 2050, Ontario will need 75 per cent more electricity than it has today to keep pace with growing demand. The IESO is supporting and undertaking a number of actions to ensure supply grows in step with demand, and one of them is the procurement of electricity generation from a diverse mix of resources. Barbara Ellard, Director Resource & System Adequacy at the IESO, will talk about the efforts behind these procurements and other actions, explaining how they will help maintain a reliable, affordable, and sustainable electricity system beyond today.

About Barbara:

Barbara Ellard is the Director of Resource and System Adequacy at the Independent Electricity System Operator (IESO). In this role, she is responsible for procuring and acquiring reliability services and incenting investment in new and existing supply resources. Barbara is leading the development and execution of a number of competitive procurements, such as the medium-term and long-term Request for Proposals. Barbara led Canada's largest storage procurement resulting in the addition of 3 GW of new resources. In addition, Barbara has responsibility over the IESO's Capacity Auction and Ancillary Services contract portfolio.



Speaker Biographies and Abstracts BLOCK 1 – HISTORY AND FUTURE

Christina Sydorko

Oil Museum of Canada

Christina is a dedicated educator who strives to create exciting and informative educational experiences. She has an Honour's Bachelor of Arts from the University of Western Ontario and a Bachelor of Education from Windsor University with subject specialization in History and Geography. Christina spent 15 years teaching in the Lambton Kent District School Board before moving to be the full time Educational Programs Coordinator at the Oil Museum of Canada, National Historic Site in 2017. She has spearheaded the creation of the virtual education programs at the museum with a focus on fact based education. Christina is also the recipient of the 2021 Award of Excellence in Programming from the Ontario Museum Association for virtual programs and the Lambton County Innovation Award for 2021. Christina was also the co-chair of Digital Advisory Committee for the Ontario Museum Association from 2022-2024.



Christina Sydorko - Abstract

Lost and Found: Rediscovering Legacy Well Construction Methods

Oil Springs in Lambton County holds the distinct honour of being the location of the first commercial oil well in North America and oldest continuously operated oil fields in North America. The development of this industry lead to pioneering oil well construction designs and methods used throughout the area. The 'Black Gold Rush' of the 1800s ushered in a period of rapid development and intense modification of the landscape to extract petroleum resources. Wildcat wells were hastily constructed and abandoned with limited oversite in hopes of striking it rich. Through investigating how these legacy wells were dug, drilled, reinforced, operated, and forgotten we can understand the changes made to the landscape. By gathering oral histories from the local community, we can find clues to the industrial past that time forgot hidden in our backyards and agricultural lands.



Matt Dupont & Brian Chan

Oil, Gas and Salt Resources Library

Brian is a GIS and Database assistant in the Oil, Gas, Salt and Resource Library(OGSRL) at London, Ontario. He has been working in the Library since 2023 and involved in the historic record digitizing projects of the library. As part of the OGSRL team, he has provided technical support on the record digitizing and matching, identifying unlicensed borehole, also the data management and input of the related database.

Matt is a Media and Information Technician with the Oil, Gas and Salt Resources Library in London, Ontario, and has been with the Library since 2016. He is responsible for processing data related to boreholes drilled under the Oil, Gas and Salt Resources Act, and creating video content related to the geology and energy resources in Ontario. He studied filmmaking at Fanshawe College and works with traditional video formats as wells as Virtual Reality. Matt has created nearly 100 videos to date for the OGSR Library YouTube channel.





Matt Dupont & Brian Chan – Abstract

Exploring for Old Wells in Historical Records

Ontario has a long history of drilling for oil and gas that goes back to the 1800s. Due to different record keeping standards many legacy wells have been lost over time. It is estimated that more than 50,000 oil and gas wells have been drilled in Ontario, however there are currently just ~27,000 wells in the Ontario Petroleum Database System (OPDS).

Lost legacy oil and natural gas wells can pose significant environmental and safety risks to both the population and environment of Ontario. Knowing where oil and natural gas wells are located is a key factor to mitigating these risks. Beyond OPDS, data sets are available at the OGSR Library that can be used by anyone to investigate and uncover missing wells. These include historical maps, reports and journals from petroleum inspectors and geologists, historical record ledgers of landowners with wells on their property, location sketches contained in known well files, and more. Powerful tools available for free on the library's website (www.ogsrlibrary.com) such as data layers for Google Earth (PxTools) and the advanced search tool can be used to compare newly uncovered records or to investigate a suspected location to find missing wells. Comparing newly discovered records to available records in the Ontario Petroleum Database System (OPDS) has helped find hundreds of missing wells so far.

This presentation discusses how the library's data sets to can be used to uncover missing wells and discusses the need to find more relevant historical information to improve these resources.



Jordan Clark Oil, Gas and Salt Resources Library

Jordan Clark manages the Oil, Gas and Salt Resources Library, the public access point for data and rock samples from wells licensed under Ontario's Oil, Gas and Salt Resources Act. With over 15 years of experience, he focuses on improving data accessibility and exploring new formats—such as 3D printing and virtual reality—to support education, research, resource decision-making, and emerging opportunities in energy exploration.





Jordan Clark - Abstract

Showcasing Geology Model in 3D Prints

Jordan K. Clark, OGSR Library, London, Ontario

Three-dimensional (3D) models of southwestern Ontario's Paleozoic stratigraphy—developed by the Geological Survey of Canada—are powerful tools for interpreting subsurface geology, yet they are typically viewed on 2D screens. To enhance communication, education, and public engagement, these models were extended into physical and immersive formats, restoring spatial intuition through hands-on and interactive experiences.

Using cleaned and validated well data, stratigraphic tops, and hydrochemical analyses, a 54-unit lithostratigraphic model and an 11-unit hydrostratigraphic framework were developed and exported from Leapfrog Works in OBJ format. Meshes were refined in Blender, annotated, and exported as STL files for 3D printing. Models were produced using both Formlabs Form 3 (SLA) and BambuLab X1C (FDM with PLA), supported by slicing software PreForm and Bambu Studio. Printed examples include multilayered basin cross sections, labelled aquifer blocks, Guelph reef structures, buried valleys, escarpments, and fault-intersected units. These prints provide tactile, intuitive access to geological features often difficult to convey through images alone.

Parallel virtual experiences were created in Unity and Reality Composer, allowing users to scale, manipulate, and walk through geologic volumes in VR or AR. Texture mapping, lighting, and level-ofdetail enhancements further increase realism. Together, physical and digital models link field data to interpretive structures in ways that support classroom learning, outreach, and resource decisionmaking. Feedback from educators, students, and the public indicates that these tools promote a faster and deeper understanding of Ontario's complex subsurface geology.



Maurice Dusseault & Richard Jackson University of Waterloo

Maurice Dusseault, PEng, is an Emeritus Professor in the Earth and Environmental Sciences Department of the University of Waterloo, having served for 42 years. As an expert in subsurface engineering, he has been involved in various technical aspects of scCO₂ sequestration for 15 years.

Richard Jackson, PEng, is an Adjunct Professor in the Earth and Environmental Sciences Department of the University of Waterloo. He is retired from Geofirma Engineering in Ottawa but continues to be active in contaminant hydrogeology, and geosequestration assessment.





Maurice Dusseault & Richard Jackson - Abstract

CO₂ Sequestration in Ontario – Status in 2025

The Southwest Ontario (SW ON) sedimentary basin appears to be the only feasible likely Canadian supercritical carbon dioxide (scCO₂) sequestration location between western Manitoba (Virden region) and Canada's the Atlantic continental shelf. The Paleozoic basins in Québec and the Atlantic Provinces lack industrial-scale permeability and porosity. In SW ON, large industrial point sources (cement and lime, steel, petrochemicals...) emit on the order of 26 million tonnes of CO₂ per year, much of which is reasonably close to potential repository locations. Industrial-scale sequestration may provide a bridge to a future with widely available low-carbon technologies, helping avoid potential SW ON deindustrialization.

Progress in formulating a sequestration regulatory policy that would provide a pathway to permits has been slow. No clear pathway to permits is yet promulgated. Corporations are loth to invest even the tens of millions of dollars required to make a reasonable quantitative assessment of the sequestration potential of the SW ON sites, let alone the billion dollars required for carbon capture and pipeline transportation.

We will review some of the recent and ongoing activity relevant to industrial-scale scCO₂ projects, delineating the sociopolitical and technical challenges faced. We specify clearly the regions and formations in SW ON that may be suitable for sequestration at a scale of at least a million tonnes of scCO₂ per year per project. A key factor is the efficiency at which a large-scale injection project can access the available pore volumes at depth for permanent placement of the scCO₂. We delineate the physical processes that must be understood to define the pore volume access potential and discuss vitally important issues such as seal integrity and induced seismicity risk.



BLOCK 2 – SAFETY, SCIENCE AND EDUCATION

Duncan Hamilton Great Lakes Geoscience Ltd.

Duncan Hamilton began his career as an exploration geologist with Petro-Canada and then worked for Shell Canada in Calgary. Mr. Hamilton moved east and was an exploration geologist with Telesis Oil & Gas Ltd. prior to co-founding Greentree Gas & Oil Ltd. (TSXV-GGOL), which he ran as V.P Exploration and then CEO for 17 years. Duncan then became Section Manager-Geosciences for the Nuclear Waste Management Organization (NWMO), evaluating sites for the disposal of high-level nuclear waste. Following this position, he founded Blackgold Ventures Ltd., an oil exploration company and Great Lakes Geoscience Ltd., a geoscience consulting company. Great Lakes Geoscience provided geological interpretations and analysis for the Wheatley Gas Explosion Site investigation.

Mr. Hamilton obtained his BSc. (Hons) from the University of Western Ontario and MSc. Earth Sciences from the University of Waterloo. Mr. Hamilton is a long-term member of the Professional Geologists Ontario (PGO) and former member of the Association of Professional Engineers and Geoscientists of Alberta (APEGA).



Duncan Hamilton - Abstract

The Wheatley Gas Explosion Site Investigation

On January 15, 1936, an explosion occurred in downtown Wheatley, Ontario and demolished a large portion of the northeast block, known as the Oddfellows Block, at the main intersection. As reported in the local newspaper, the Oldfellows Block was reduced to ruins by the fire and explosion. At the time, the cause of the destruction was considered a mystery, and a number of theories were reviewed but with a lack of evidence to substantiate them. The site was rebuilt and was relatively quiet until 1993 when gas leaks were reported and tested. The tests indicated the gas was not from a leaking pipeline but thermogenic in origin.

The site was relatively dormant until August 26, 2021, when a hydrogen sulfide gas explosion occurred on the same site, resulting in twenty people being injured and causing extensive damage to the downtown block. During demolition of the surrounding structures, the gas was traced to old abandoned natural gas wells drilled on the site in the late 1800's (termed legacy wells). Subsequent investigation activities uncovered additional undocumented wells, and it was determined that the natural gas leaking from the legacy wells had migrated into the subsurface water system.

This presentation will review the prior history of events on the site and the results of the detailed site investigation that was conducted in 2024. The site investigation led to a number of critical actions being instrumented to mitigate future potential risks of hydrogen sulphide gas leaks in the area. The findings of the Wheatley Gas Explosion Site Investigation illustrate the potential risks to infrastructure development in municipalities with historical oil and natural gas legacy wells.



Stew Hamilton Montrose Environmental

Stew Hamilton has been a Senior Geochemist at Montrose Environmental for three years and most of this time he as been working on projects related to legacy petroleum wells. Before that, he was Science Leader for Geochemistry at the Ontario Geological Survey, where he has worked for 28 years, the last 15 of which was spent mapping the ambient chemistry of groundwater across southern Ontario, for which he was co-recipient of Ontario's Amethyst Award in 2017. He is a hydrogeologist and aqueous geochemist but has also published, to varying degrees, in the fields of geology, exploration geochemistry, electrical geophysics, microbiology, epidemiology and dendrochronology. Dr. Hamilton is a past Distinguished Lecturer for the Association of Applied Geochemists and a recipient of the Provincial and Territorial Geologist's Medal.



Stew Hamilton - Abstract

Ontario's Unique Challenges in Identifying the Source of Leaking Gas Wells

The Ontario Oil and Gas industry is small by world standards with its 27,000 recorded petroleum wells only representing about 5% of Alberta's historic total, for example. But Ontario's industry started more than 165 years ago, long before best practices were developed, and this has created an outsized problem with respect to the environmental impact of legacy gas wells. Unknown wells, poorly decommissioned production and exploration wells have combined with some unique challenges related to geology. One of these is upward regional hydraulic gradients on Pelee Island, the Niagara and Essex Peninsulas and the north shore of Lake Erie. The driving pressure for these gradients may originate from the U.S. side of the lake. Thousands of legacy oil and gas wells in these regions may have connected shallow aquifers to deeper subsurface evaporitic strata and allowed the upward movement of "sulphur water". This, coupled with the normal process of upward buoyant gas transport results in large-scale contact between sulphate and methane, resulting in biogenic production of hydrogen sulphide. This is now a widespread problem on the Niagara & Essex Peninsulas, Pelee Island, and in incised river valleys along the north shore of Lake Erie. It is notably not a problem in other areas for reasons that are not always understood. In addition to this, leakage of methane, even in small quantities, can be a serious hazard for structures that are more commonly being built in formerly rural areas that hosted gas wells.

Montrose Environmental has supported the decommissioning of over 20,000 legacy wells across Canada. We have a large inventory of forward looking infrared (FLIR) cameras, UAV mounted lasers, thermal cameras and personnel and equipment dedicated to leak detection above and below ground and below the water table. We have active legacy gas well projects across southern Ontario for private and public sector clients.



Hazen Russell

Geological Survey of Canada

Hazen Russell is a clastic sedimentologist at the Geological Survey of Canada. He has a PhD from the University of Ottawa where he studied meltwater discharge processes and esker–subaqueous fan deposits. He was particularly interested in the application of multidisciplinary basin analysis studies to glacial sediments to support groundwater studies. He was first involved with the Oak Ridges Moraine study and subsequently a range of studies of glacial sedimentary aquifers. He was project lead for the southern Ontario groundwater project which developed the geological model framework of the accompanying talk.





Hazen Russell – Abstract

A 3D geological-hydrogeological modelling framework for southern Ontario

Russell, H.A.J¹., Carter, T.R²., Frey, S.K³., Logan, C.E¹., Clark J.K⁴., and Bunn, M¹.

¹Geological Survey of Canada, Natural Resources Canada, 601 Booth St., Ottawa, ON K1A 0E8
²Carter Geologic, 35 Parks Edge Cres, London, ON N6K 3P4, Canada
³Aquanty Inc. 564 Weber Street North, Unit 2 Waterloo, ON N2L 5C6
⁴Oil, Gas, Salt Resources Library, 669 Exeter Road London, ON N6E 1L3

Divisive and competing land use and subsurface management issues in southern Ontario require an integration of disparate datasets and a coordinated geological-hydrostratigraphic-numerical flow modelling framework. This data integration provides a necessary tool for understanding an international transboundary watershed with greater than 20 percent of Canada's population and GDP in an area of intense agriculture. The resulting consolidated framework is critical to addressing societal needs under cumulative land-use pressures, and climate change scenarios. The first step toward this endeavour was the identification of a knowledge base for the geological systems and data management challenges. This was complemented by an assessment of data support, data QA/QC processes and the representation in datasets of geological features. Following this assessment a modelling strategy was developed considering geological system scale, geographic variability, and unit heterogeneity for the bedrock and surficial geology. The outcome of data integration is a formation scale, 55-layer, bedrock lithostratigraphic model. The model domain covers 110,000 km² with a modelled volume of over 75,000 km3. The modeling involved an iterative process of model development, model QA/QC and both data correction and review of model workflow and protocol including a confidence estimation for each bedrock layer. Following completion of the lithostratigraphic model, a similar, though simpler process was undertaken to generate a reclassified 15-layer hydrostratigraphic model. Independently, an eightlayer surficial geological model was developed for a similar terrestrial extent. In addition to borehole and geophysical data, the surficial model incorporates subsurface information from existing sub-regional (<10,000 km²) 3-D models. In parallel with geological modelling, a physics based, fully coupled groundwater-surface water flow model was developed in HydroGeoSphere by Aquanty Inc. A coarse model version extends to Precambrian bedrock and honours 4th order streams and a higher-resolution, 3rd order stream model extends to the base of brackish water. The framework has subsequently been applied by the Ontario provincial government for watershed groundwater modelling, the Canadian federal government for resource assessments, and regional water storage change assessments. Additional work has been completed to ensure model accessibility through application of 3D printer technology, augmented reality, virtual reality with the Ontario Oil, Gas and Salt Resources Library, and 3D model viewing in a web viewer developed by the Polish Geological Institute. These models are a demonstration of federal-provincial collaboration, recognition of jurisdictional responsibilities and commitments, institutional capacity and expertise, and the value of framework geoscience initiatives accompanied by government open data policies.



John Johnston University of Waterloo

John Johnston is an Associate Professor – Teaching Stream and Associate Chair - Undergraduate in the Department of Earth and Environmental Sciences at the University of Waterloo. He has been fortunate to gain experience at Chevron Canada Resources, the Indiana Geological Survey, Indiana University, Wilfrid Laurier University, University of Toronto and University of Waterloo. He loves coastal geology, researching lake levels from ancient shorelines in the upper Great Lakes and Mackenzie River watershed. John also loves recruiting and inspiring the next generation of Geoscientists and Geologic Engineers in classes such as Introductory Earth Sciences, Stratigraphy and Geological Field Mapping. Educational research has John currently exploring new integrated learning pathways that engage students in immersive learning in the field and with 3D digital models and tactile learning with 3D print models.



John Johnston - Abstract

How do we efficiently integrate geological 3D models into university education to acquire the knowledge and skills for career-ready Geoscientists and Engineers?

John Johnston¹ and Heidi Daxberger²

¹Department of Earth and Environmental Sciences, University of Waterloo, 200 University Avenue West, Waterloo, ON N2L 3G1 jwjohnston@uwaterloo.ca ²Department of Physical and Environmental Sciences, University of Toronto Scarborough, 1265 Military Trail, Toronto, ON M1C 1A4 heidi.daxberger@utoronto.ca

Compiling and simplifying information from thousands of wells into visibly appealing and helpful digital and 3D-print models is an amazing feat. But how do we go beyond the initial excitement of these threedimensional models? And how do we achieve effective and prolonged student engagement and learning so that students acquire the knowledge and skills to become future-ready Geoscientists and Engineers?

To meet this goal, we assembled a diverse group of experts and iteratively tested the effectiveness of the use of digital 3D models and physical 3D printed models with students in courses at different universities (University of Waterloo, University of Toronto). We found that understanding the barriers and knowledge gaps in learning, as well as lowering technical limitations were critical to an iterative advancement of the 3D models and development of learning pathways. Refinement of these interventions have helped students develop geospatial awareness, understand data limitations and connect geologic data with everyday life. This process also helped the students to articulate their experiences by using the University of Waterloo's Future Ready Talent Framework.



BLOCK 3 – STORAGE AND RESERVOIRS

Peter Budd

Bedrock Energy Inc. & OPI Vice Chair

Peter opened his legal career working in Calgary as a junior regulatory lawyer at Bennett Jones LLP, specializing in administrative law actions in the oil and gas industry. Representing clients ranging from governments to pioneering First Nations utility ownership, with an emphasis on pipeline open access and continental gas marketing across Canada, the legal career proved a gateway to political policy making primarily in Ontario's power business.

Assisting with the drafting of Ontario's Electricity Act, 1998, Budd was appointed by the Ontario Cabinet to the Market Design Committee, and the newly created Independent Electricity Market Operator. Budd was elected by power and gas peers from the Ontario Natural Gas Association where he was a director, to be the inaugural chair of the Ontario Energy Association and served on several committees as the former Ontario Hydro power market was transformed into a competitive electricity environment.

Budd served Five Nations Energy Inc. as their Corporate Secretary in constructing a precedent-setting AC power corridor to remote First Nations communities, removing dirty diesel generation as the sole electricity source. Later as Ontario's power market was retracted and provincial investment was imperiled, Budd spearheaded Cabinet to create a committee, to which he was appointed Co-Chair of Ontario's Conservation and Supply Task Force. In later years, Budd worked internationally at Cameron McKenna in London UK offering advice on adapting multi-Canadian energy successes globally.

Now a GR, strategic business advisor and entrepreneurial renewable power developer, Budd chooses to work with dedicated teams in the energy business as the transition continues into tidal power, solar, CCS, CAES and hydrogen works. With three grown sons and grandsons, Budd has zero plans for retirement in the exciting energy transition.

NOTES

EPEX 2025: OPI 62nd Conference and Trade Show – May 27th to 29th Best Western Lamplighter Inn & Conference Centre, London, Ontario



Peter Budd-Abstract

Navigating Ontario's Regulatory Hurdles: Strategies and Insights

Where is Ontario Headed in a Complex Energy Landscape?

Topical Items

- 1. Understanding Ontario's Evolving Energy Regulatory Framework: *3 Agencies & Anticipated Activities*
- 2. Commercial Challenges in Regulatory Compliance
- 3. Effective Strategies for Compliance Coordination
- 4. Future Trends in Ontario's Regulatory Energy Landscape



Peter Johnston

HPJ Geological Engineering Ontario (HPJ GEO) Inc.

Hilton P Johnston is a Geological Engineer graduate from the University of Toronto. He worked in mineral exploration for several years and co-authored a paper for the GSC on gold potential in Newfoundland. His work took him to the world class gold mines of South Africa where he spent 7 years with the Anglo American Corporation. Since returning to Canada, he joined Union Gas Ltd and worked in the Underground Storage and Business Development departments for nearly 20 years. He continued his career through several mergers and retired from Enbridge in 2019. He is presently the owner of HPJ Geological Engineering Ontario (HPJ GEO) Inc. providing geological engineering services to the energy industry in Ontario.



Peter Johnston - Abstract

The Evolution and Devolution of Unregulated Storage in Ontario

Natural gas storage in Ontario was an industry fully regulated by the Ontario Energy Board (OEB) since the early 1960's. During this time, utility companies competed for the natural assets discovered and proven by the petroleum industry to be suitable storage containers for these utilities. The concept of unregulated natural gas storage in Ontario began in the late 1990's after decades of regulation.

This presentation is focused on the full circle journey of the unregulated natural gas industry during and after the implementation of relevant OEB policies, where it is today, and how this outcome is impacting various stakeholders.



Dan Silber

Elexco

Dan is a New York licensed attorney with a JD, and has been with Elexco for over fifteen years. He has significant experience in many facets of all different types of energy, utility and telecommunications projects in the northeastern United States, as well as other parts of the U.S. and Canada. Dan's experience on these projects include the acquisition of land rights, preparation of abstracts of title, due diligence, and related project management. Prior to joining Elexco, Dan worked with several energy and telecommunication companies through an upstate New York law firm.





Dan Silber - Abstract

The Right to Extract vs. the Right to Store

This paper explores the evolving use of property for natural resource exploration, production, and storage. With more surface lands being used for renewable energy projects, there are more opportunities for conflicts between surface and subsurface projects. And with a variety of energy projects utilizing underground storage, there are also more opportunities for conflicts between exploration and storage uses. Traditionally, energy projects have focused on extraction, with depleted reservoirs being used for storage on a much smaller scale. However, new storage projects (primarily for either sequestration or as a battery) will require thousands of contiguous acres in stratigraphic zones that may be within the same column as an extraction project. This talk explores some examples where these projects might conflict, and will review contractual language where the exact wording can be critical in determining which party's rights are superior.



Steven Tedesco

Running Foxes Energy Inc.

Dr. Steven Tedesco has over 40 years of experience in the energy industry including coal, helium, nuclear, oil, gas, hydrogen, wind and solar. Dr. Tedesco operates Running Foxes Energy Inc. which focuses on waterflooding of shallow oil reservoirs, helium, coal bed methane and conventional oil and gas production in the Uncompangre Uplift, Powder River, Cincinnati Arch, Rome Trough, Williston, Denver, Forest City and Cherokee basins, USA. Dr. Tedesco is the US representative for MRE Wind and Solar based out of Centennial, Colorado that is in the process of building wind, solar and battery facilities in Arizona, New Mexico, Kansas, Colorado and Utah. He is also Chief Science Officer for Energid Energy Inc. which focuses on converting natural gas assets to, hydrogen, ammonia, electricity and crypto-mining. Dr. Tedesco has a BS in Geology from Northeastern University in Boston, a MS in Geology from Southern Illinois University at Carbondale, IL, and a PhD in Geology with a minor in Petroleum Engineering from the Colorado School of Mines., He has published numerous articles and presented several talks at international industry meetings on coal bed methane, surface geochemistry, helium, hydrogen, structural geology, petroleum engineering, and stratigraphy. Dr. Tedesco has been CEO and President of a Canadian Junior Public Company, Admiral Bay Resources that is now known as PredictMedix. He was involved in taking two other companies public on the OTC, General Cannabis and Epsilon Energy. Dr. Tedesco has published the only text book specifically focused on the use of surface geochemistry in petroleum exploration that was published in 1994. Dr. Tedesco recently published the only book on helium, geology and associated gases by Elsevier Publishing that was released in April, 2022.

Steven Tedesco - Abstract

Helium Exploration East Of The Mississippi River, North America

Helium (He) exploration in the eastern half of North America has been limited to Southwestern Ontario during WWI and shortly thereafter, and recently around the Rome Trough, Kentucky. There is an extensive USGS database for He in some areas of the eastern North America but much of the data has to be considered potentially unusable. The quality and accuracy of early laboratory technology, collection methodology and quality control at historically was not the best. Southwestern Ontario was originally the focus by the British in WWI to extract He. By the time He extraction technology was perfected the existing gas fields in southwestern Ontario at the time were depleted and the British moved on to the Bow Island Arch area in Alberta and Saskatchewan. Since than a number of shallow productive natural gas Cambrian sandstone fields in Southwestern Ontario have been found and economic He is present (based on today's prices). Many of these fields were discovered in the 60s, 70s and 80s but since then exploration in the area has declined dramatically. The eastern limbs of the Mid-Continent Rift system which extends through the center of Michigan and down into Ohio, Indiana, Kentucky, Tennessee and Alabama has scattered He data. In Michigan, several shallow gas productive Mississippian Stray sandstone fields that directly overlie the Mid-Continent Rift had economic He (based on present prices). The Rome Trough in Central and Eastern Kentucky has significant He (>1%) in at least to wells from Cambrian sandstones. One well was recently completed in the Cambrian sandstone that initially flowed approximately 2 MMCFGPD and fracture stimulated resulting in over 15 MMCFGPD with 1% He. The well produced He for six months and watered out. The host gas in the Cambrian sandstones in the Rome Trough seems to be mainly nitrogen. The rift segments in Indiana, Ohio, southcentral Kentucky, Tennessee and northern Alabama have limited or no testing and no He data analysis.



CORE WORKSHOP – CAMBRIAN PORE SPACE

Allan R. Phillips¹ & Frank Brunton²

¹Clinton-Medina Group, ²Ontario Geological Survey

Frank Brunton is an OGS Geoscientist (PGO) with 40yrs of field-based, applied mapping experience of Paleozoic sedimentary rocks globally - expertise in carbonate geology, potable bedrock groundwater and karst mapping, industrial/critical materials, and subsurface energy storage. Frank was an applied academic researcher & consultant while at University of Ottawa, Queen's and Laurentian University during the 1990s. He was Manager of Geoscience Education and external geoscience consultant at Science North (2000-2003). Frank joined the Ontario Geological Survey in 2003 and has worked on a variety of provincial and federal multi-ministerial projects. He was recognized with The Amethyst Award in 2017, for collaborative and innovative delineation/mapping of potable groundwater resources and karst landforms in Paleozoic strata in southern Ontario. He has been an Adjunct Professor at University of Waterloo (2004-2006), The Ohio State University, Lima Campus (2007-2014), and the University of Western Ontario (2009-present), and has co-supervised masters, doctoral and post-doctoral candidates who have carried out Ontario-based mapping projects that supported OGS mapping initiatives.

Allan Phillips is a consulting geologist and president of the Clinton-Medina Group. Just weeks after receiving his HBSc degree in Geological Sciences from Brock University he was working as a well-site geologist in the middle of Lake Erie. Today his career has gone full circle, and he is back working on the Paleozoic geology of southwestern Ontario. His career has spanned over four decades and allowed him to explore for oil and gas in several basins in Canada and northeastern United States. In his quest to better understand these complex reservoirs he has logged many cores and studied numerous drill cuttings. Lithologically these rocks have ranged from traditional reservoirs in clastics and carbonates, to unconventional reservoirs in mudstones and shales. This career path has taken a detour in recent years and the reservoir evaluation studies are now also focused on storage potential. Today he is looking at putting carbon and other products back into underground reservoirs. Most recently he has been able to share his experience and expertise on the carbonate and clastic reservoirs in southwestern Ontario with the next generation of geoscientists as an adjunct research professor at the University of Western Ontario.

EPEX 2025: OPI 62nd Conference and Trade Show – May 27th to 29th Best Western Lamplighter Inn & Conference Centre, London, Ontario



Allan R. Phillips & Frank Brunton - Abstract

Cambrian subsurface of southwestern Ontario: competition for pore space Allan R. Phillips¹ & Frank Brunton² ¹Clinton-Medina Group, ²Ontario Geological Survey

Three cores have been selected to illustrate variations in the Cambrian reservoir of the subsurface of southwestern Ontario. The Cambrian succession pinches out along an irregular SW-NE trending paleotopographic region spanning a number of Proterozoic Grenville terrains (colloquially referred to as the Algonquin Arch; Figure 1). This region has been used to erroneously separate the Michigan Structural Basin to the west and northwest from the Alleghany sub-basin of the Appalachian Foreland Basin, located to the southeast. Cambrian and Lower to Middle Ordovician age strata are absent within this subsurface paleotopographic basement region. Within this region, Upper Ordovician limestones and mixed shale/silty sandstones sit unconformably on Proterozoic regolith and crystalline basement rocks. As a result of the proximity to paleotopographic highs, the drill depth to basement along the erosional edge of the Cambrian section is relatively shallow. The top of the Cambrian is encountered at 597m (1959 ft) in the Hamilton region and at 1429m (4688 ft) in the Sarnia area (which is in the Grenville Front Tectonic Zone). The top of the Cambrian succession is at a depth of approximately 1246.63m (4089 ft) and reaches a maximum thickness of 176.5m (579') in the CPOG Haldimand #1, Lake Erie 131-G-4 (Permit No. T003011) well along the Canada-US border in the centre of Lake Erie (TD = 1430.4m). Wells will encounter a Cambrian section that typically comprises interbedded feldspathic sandstones and shallow water dolostones. Reservoir quailty is variable and the secondary porosity can exceed 20-30% with permeability in the 200-300 mD range in the better sandstone reservoirs.

Oil and gas has been produced from Cambrian reservoirs for more than a century. Early drilling in the late 1800's was typically in and around urban centres and wells taken deeper under the shallow Devonian and Silurian oil and gas reservoirs. In early November 1923, oil was produced from a depth of 1085.1m (3560 ft) in the Southern Ontario Gas Company No. 6 Shanks well in Raleigh Township. This wildcat well was a deeper test under the Silurian Tilbury Gas Pool on the north shore of Lake Erie. In the early 1960's three modest oil pools with production over 1 million barrels (158,983 m³) were discovered along the southeastern edge of the "Algonquin Arch". Core from the Imperial # 808, Orford 8-55-NTR (Permit No. T001303) is one of the three cores available for viewing. The Innerkip Gas Pool outside Woodstock is the up-dip gas cap to the Gobles Oil Pool, drilled up in the 1990's. It has produced about 30 BCF (850,000,000 m³) of gas to date. Southwestern Ontario Cambrian reservoirs have been used for brine disposal, and for industrial waste disposal in Detroit and Port Huron, Michigan.

Cambrian subsurface of southwestern Ontario: competition for pore space, cont'd

The three cores displayed show variations in the Cambrian lithofacies and reservoir quality. The dolomitic sandstones are the primary reservoir for hydrocarbon production and disposal of brine and industrial waste. These feldspathic sandstone reservoirs possess variable degrees of secondary cements which result in significant variations in porosity and permeability. The interbedded numerous dolostone sequences found interbedded with the sandstone units, show much poorer reservoir quality. These dolostones are often laminated and oolitic suggesting shallow water deposition. The cores displayed also illustrate some of the hetrogeneity observed in the Cambrian succession. The Dundee East, Lake Erie 45-E-4C (Permit No. T012159) Cambrian core has become the type section in the subsurface of southwestern Ontario and has the most detailed suite of secondary data (geophysical logs, core analysis, and petrographic/SEM studies). Portions of core from this well have been selected to illustrate changes in lithology and reservoir characteristics within the ~100m Cambrian succession. Core from the Consumers' 13603, Lake Erie 184-K-3 (Permit No. T004933) well will also be displayed. An uppermost Cambrian gas reservoir under the Knox unconformity can be traced form northeastern Ohio and northwestern Pennsylvania northward into the Ontario portion of central and easten Lake Erie. This play type and Cambrian reservoir is unique and underdeveloped.





Cambrian subsurface of southwestern Ontario: competition for pore space, cont'd



Cores Displayed:

Core #1: (regional Cambrian core) Dundee East, Lake Erie 45-E-4C Permit # T012159, Ontario Oil, Gas & Salt Resource Library Core #1130 Interval: 1000.0-1107.6m (cut: 107.6m)

Core #2 (Clearville Oil Pool core): Imperial # 808, Orford 8-55-NTR Permit # T001303, Ontario Oil, Gas & Salt Resource Library Core #203 Interval: 3939-4086 feet, 1200.6-1245.4m (cut: 147', 44.8m)

Core #3 (uppermost Cambrian section): Consumers' 13603, Lake Erie 184-K-3 Permit # T004933, Ontario Oil, Gas & Salt Resource Library Core #700 Interval: 1262.5-1276.2m (cut: 13.7m)



BLOCK 4 - CAMBRIAN AND CO2 SEQUESTRATION

Jacob Wright & Jason Dodd Weatherford

Jacob Wright serves as a Senior Geoscientist and North American manager for Weatherford's Interpretation and Evaluation Services (IES) department. He holds a Bachelor of Science in Geology from Texas A&M University. He began his career as a wireline Field Specialist before transitioning to the geoscience department in 2014. As an expert in Well Integrity, Jacob has offered technical support worldwide and prioritizes knowledge sharing throughout his professional journey.

Jason Dodd is an experienced Operations Manager based in Canada, specializing in Managed Pressure Drilling (MPD). With over 20 years in the petroleum industry, Jason has honed his expertise through diverse roles in multiple countries, managing both offshore and land operations. His extensive background includes proficiency in MPD, Underbalanced Drilling (UBD), and Rotating Control Devices (RCD), making him a versatile and highly skilled professional in the field.



Jacob Wright – Abstract

Innovative Drilling and Assessment Techniques for Carbon Capture and Underground Storage

The increasing demand for renewable energy, including carbon capture and storage, presents ongoing challenges for operators. Ensuring wellbore integrity is crucial for reducing costs and enhancing sustainability throughout the well's lifespan. Developing and implementing a comprehensive strategy that includes a detailed drilling plan to identify, monitor, and mitigate drilling hazards, along with a robust wellbore evaluation to assess reservoir storage potential, enables operational improvements and risk avoidance. This presentation examines advanced drilling and monitoring techniques that maintain borehole integrity and extend the well's operational life.



Bruce Hart Western University and NRCan

Bruce Hart is a geoscientist and two-time AAPG-SEG Distinguished Lecturer who, over the past 35 years, has worked in academia, for two major oil companies, and for government geological surveys. He has (co)authored over 70 papers in peer-reviewed journals, has taught industry-focused short courses in Canada, the USA, Malaysia, Egypt, Denmark, UK, and elsewhere, and authored an AAPG textbook on seismic interpretation. Bruce is currently a consultant and an adjunct professor in the Department of Earth Sciences at Western University.





Bruce Hart – Abstract

Carbon Capture and Storage in Southwestern Ontario: The Geologic Challenges

Cambrian sandstones of southwestern Ontario have once again become potential targets for carbon capture and storage (CCS). Compared to working CCS facilities elsewhere in North America, Cambrian sandstones here are thick enough, porous and permeable enough, and deeply enough buried to serve as repositories. There are, however, several significant unknowns that will need to be addressed.

The first involves property prediction away from existing well control. If a test is unsuccessful because of the geology, does that condemn all of SW Ontario or could a test have been successful a few 10s of km away? For many parts of the subsurface, the nearest data control can be >50 km away. The petroleum industry typically relies on depositional models to qualitatively predict properties away from well control, but no such models have been defined for the Cambrian in this area.

A second challenge relates to the geomechanical stability of the Cambrian and its overburden. What is the likelihood that CO2 injection might be affected by faults or fracture systems, or that injection might trigger seismicity? Large parts of the potential play have no seismic data (2D or 3D) and so faults, if present, cannot be adequately mapped. Furthermore, there are no published geomechanical data for the Cambrian and overlying seals, and wireline log data necessary to compute those parameters are rare to non-existent.

A third unknown centers on the nature of the in-situ pore-filling fluids and gases. The movement of injected CO2 will be affected by other fluid/gas phases (relative permeability) and the lateral spread of a pressure pulse away from a borehole will be affected by the compressibility of the pore-filling phases. At least three fluid phases (brine, oil, gas) are present in the Cambrian. What happens when a fourth (supercritical CO2) is added?

Other challenges, for example fluid-rock interactions and their effects on injectivity, will need to be addressed if/when commercial CCS hubs are established.



Ming Liu Big Guns Energy Service

Mr. Liu joined BGES in 2014 and is the Manager of BGES' Geotechnical lab and Director of Geotechnical Engineering and Innovation. With over 15 years of experience serving the energy industry, he has become an expert in geotechnical and geomechanical engineering for carbon capture, utilization and storage (CCUS), SAGD, salt cavern, hydrogen Storage and underground waste disposal. Through out his career, Mr. Liu have completed thousands laboratory tests for various industrial and research projects. Mr. Liu is a registered Professional Engineer in Canada and holds a Master's degree in Geotechnical Engineering from University of Alberta.





Ming Liu – Abstract

Key Geotechnical Lab Tests for Underground CO₂ Storage

Carbon Capture and Storage (CCUS) has emerged as a critical technology in the battle against climate change. To ensure the safe and effective underground storage of CO₂, it is essential to thoroughly assess the suitability of geological formations.

Geotechnical lab testing provides vital insights into key rock properties – such as strength, permeability and capillary breakthrough pressure. These tests are key in understanding the long-term stability of CO_2 storage sites. In this section, we will explore the key geotechnical lab tests associated with CO_2 underground storage.



Philip R. Walsh Toronto Metropolitan University

Dr. Walsh is a Professor in Entrepreneurship & Strategy at the Ted Rogers School of Management at Toronto Metropolitan University (formerly Ryerson University). He is also a faculty member in the Environmental Applied Science and Management graduate program. Phil has been actively involved in the Canadian oil and gas industry for over 40 years as an Exploration Geoscientist, Energy Executive and Industry Consultant. His industry experience includes oil and gas exploration, natural gas storage, strategic planning and policy. Currently, he is a Principal Investigator at TMU's Center for Urban Energy and an Advisor to its Clean Energy Zone. Dr. Walsh is the co-author of the books "Corporate Responsibility and Sustainable Development", and the Canadian Edition of "Foundations of Strategy". Dr. Walsh has also published his research on sustainable innovation in a number of top-tier academic journals. He holds a B.Sc. (Hons) in Geological Sciences from Queen's University, an M.B.A from the Ivey School of Business, Western University, and a Ph.D. in Strategic Management from the University of Bradford, U.K.



Philip R. Walsh – Abstract

Commercializing CCUS – Lessons learned from the U.K. Experience

Dr. Walsh is a Professor in Entrepreneurship & Strategy at the Ted Rogers School of Management at Toronto Metropolitan University (formerly Ryerson University). He is also a faculty member in the Environmental Applied Science and Management graduate program. Phil has been actively involved in the Canadian oil and gas industry for over 40 years as an Exploration Geoscientist, Energy Executive and Industry Consultant. His industry experience includes oil and gas exploration, natural gas storage, strategic planning and policy. Currently, he is a Principal Investigator at TMU's Center for Urban Energy and an Advisor to its Clean Energy Zone. Dr. Walsh is the co-author of the books "Corporate Responsibility and Sustainable Development", and the Canadian Edition of "Foundations of Strategy". Dr. Walsh has also published his research on sustainable innovation in a number of top-tier academic journals. He holds a B.Sc. (Hons) in Geological Sciences from Queen's University, an M.B.A from the Ivey School of Business, Western University, and a Ph.D. in Strategic Management from the University of Bradford, U.K.



Exhibitors

Baker Hughes

Baker Hughes is an energy technology company that provides solutions to energy and industrial customers worldwide.

Conducting business in over 120 countries and approximately 58,000 employees, we design, manufacture, and deliver leading technology solutions for our customers. Powered by the industry's only end-to-end technology portfolio, and enabled by our people and scale, we drive productivity and improve outcomes for ourselves and our customers.

From the first rotary drill bit to the world's most extensive portfolio of compressors and gas turbines, and from digital solutions that predict outcomes to modular deep-water technology, for more than a century our inventions have been revolutionizing the industry.

We are reducing the carbon intensity of our operations, applying proven low-carbon technology to help our customers meet their environmental goals, and innovating for the future of energy.

At Baker Hughes, we are taking energy forward – making it safer, cleaner, and more efficient for people and the planet. Visit us at <u>bakerhughes.com</u>.



BGES (Big Guns Energy Services Inc.)

BGES (Big Guns Energy Services Inc.) is a leading provider of specialized in-situ reservoir testing and subsurface containment evaluation. In 2023, our expertise in Geologic Carbon Sequestration was featured in a cover story. Further accolades include being named Company of the Year in 2022, receiving the Oil & Gas Award, and earning a place among the Top 200 companies by Alberta Oil Magazine.

Since our inception in 1996, BGES has been at the forefront of applying science to prevent safety, environmental, and financial calamities. Our approach is underpinned by a specialized, multidisciplinary team that successfully narrows the gap between concept and implementation. This strategy not only optimizes our in-house operations but also pushes the boundaries, with a keen focus on innovations.

With a deep specialization in CCUS, Energy Storage, Unconventional Resources, and Oilsands, BGES has conducted field operations across Canada, complemented by a dedicated geotechnical lab in Alberta. Our company's success is attributed to a seamless integration of operational integrity and technical prowess, led by a leadership team with decades of experience in geoscience, geomechanics, and engineering, addressing some of the industry's most complex challenges.



Double B Well Services

Double B Well Services Ltd. was founded in 2013 by Ben Barnes, a Petroleum Engineering Technologist and the fifth generation of his family to be involved in oil production and well servicing in the historic Ontario oil and petrochemical industry.

Double B Well Services Ltd. was formed to provide local expertise tailored to the unique underground hydrocarbon storage industry of Southern Ontario, mainly centered around Sarnia and Lambton County.

Services provided include onsite wellsite supervision, workover and testing program development and engineering, project management, and equipment sourcing.

Building on Ben's experience working with his Father completing over 100 oil and gas well abandonments in Southern Ontario, Double B Well Services Ltd. also offers a complete one-stop source for oil and gas well abandonments from program development to completion. Our modern equipment and techniques paired with historical knowledge, insights and decades of experience are specially tailored to the wide variety and unique challenges encountered with Ontario's historic and century old oil and gas wells.

Double B Well Services Ltd. also provides experienced crews, well service rigs, fluid injection pumps, pipe handling, well control equipment and services specifically designed for geological investigation and testing projects.

Ben Barnes, President

Double B Well Services Ltd.

(519) 381-9337

Ben-barnes@hotmail.com



Elexco

<u>Elexco</u> is a full service land company providing land consulting and land administration services for the renewable energy, oil and gas, utility and telecommunication industries in North America. Services include land acquisitions, land negotiations, right of way, oil and gas leasing, easements, title curative, land registration, GIS services, customized mapping and seismic permitting.

Suite #101 – 557 Southdale Road E

London, Ontario,

Canada N6E 1A2

Name: Niki Clarke

Email: nclarke@elexco.com

Tel: 519-686-0470

Toll Free: 800-603-5263 (Land)

Fax: 519-686-9088



Lee Specialty Seals Inc.

We are a manufacturer of special down hole and B.O.P. Composites for Wire line, coil tubing and fracking. We are Iso 9001 certified.



LimeGREEN

For 10 years, LimeGREEN has been one of Ontario's fastest growing tank rental companies, with equipment yards located in Hamilton, Trenton, Sudbury, Ottawa, and now Thunder Bay. We are 100% Canadian owned, and dedicated to service with proven results. Many sectors have benefited from LimeGREEN's service, and rental inventory such as Construction, Pipeline, Industrial Services, Drilling, Dewatering, Water Treatment Plants, Refineries, Mines and many others. Tanks, tanks, and more tanks. Waste tanks, settling tanks, open top tanks, weir tanks or Enviro tanks, and many other types, all designed to SAVE you TIME and MONEY. Supporting the growing inventory of tanks, are Filters, pumps, and hose, spill berms, and flowmeters. Have a special "one off" request? Speak to a LimeGREEN representative about your needs, and we'll work with you, to help keep your project on schedule, and on budget.



Ministry of Natural Resources and Forestry

The very first commercial oil production in North America started in Ontario in 1858. Since that time, many tens of thousands of wells have been drilled in the province, predominantly in southern Ontario. The Ministry of Natural Resources and Forestry's Petroleum Operations Section (POS) ensures compliance with the Oil, Gas and Salt Resources Act, its regulations and the provincial operating standards through issuing licences and approvals, and inspection. This framework provides oversight for the exploration, development and decommissioning of wells and works associated with oil, gas, solution-mined salt and underground storage resource-related activities (e.g., hydrocarbons, compressed air, carbon dioxide), to ensure these regulated activities are done in a safe, environmentally responsible and efficient manner.



OGSR Library

https://www.ogsrlibrary.com/

The management of Ontario petroleum well data by the Oil, Gas and Salt Resources (OGSR) Library is now in its 27th year and represents a rare case of an industry-funded petroleum data centre. Collection of oil well data in the Province occurred shortly after the first hand-dug well of 1858. Government management of public petroleum well data was handed over to the industry to be maintained in trust in 1998.

The OGSR Library has prioritized the digitization and modernization of the data catalogue to provide maximum value to industry. In response to these initiatives, industry and government partners have engaged with the Library on more complex and innovative projects that would not have been possible otherwise. The Library has also engaged with data users outside of the traditional petroleum industry by highlighting the applicability of petroleum data to Universities, environmental consultants, and groundwater researchers, evolving the Library into a geoscience research centre.





Oil Museum of Canada

The Oil Museum of Canada, National Historic Site is a non-profit museum, owned and operated by the County of Lambton. We preserve the site of the very first commercial oil well of North America, dug by James Miller Williams in 1858. At the 100-year anniversary, a committee of community and industry support gathered. Representatives from all over the county and oil industry created the Oil Springs Museum Committee. The Oil Museum of Canada opened to the public in 1960.

Oil Springs received a National Historic Site designation in 1925 from the Historic Sites and Monuments Board of Canada. The Museum is located on the site of a rare industrial landscape that marks the beginnings of the oil industry in Canada. This site is credited with a handful of national and international achievements. Registration of the world's first petroleum company, first commercial oil well in North America, first commercial oil field in the world, and first oil and gas gushers in Canada, to name a few. In 2006, the Historic Sites and Monuments Board of Canada cleared up the boundaries of this designation. Its revision now includes all the original oil field. Both the museum and Fairbank Oil Fields make up this national designation. The first commercial oil well dug by James Miller Williams in 1858 is on the Oil Museum of Canada's grounds. The first gusher struck by John Shaw in 1861 is on the adjacent Fairbank Oil Fields.

The Oil Museum of Canada collaborated with community and planning stakeholders in 2010. Together we achieved the designation of Ontario's first Industrial Heritage Conservation District.

In 2017, we partnered with Fairbank Oil Fields to ask Parks Canada to include our sites on the Tentative World Heritage Sites List. This would ultimately lead to UNESCO World Heritage Designation. Unfortunately, we were not successful. Feedback from this application is supporting future paths as we expect our reapplication in 2027.

The Museum and outdoor exhibit buildings contain a range of petroleum industry artifacts, interactive exhibits, fascinating stories, intriguing photographs and more! The Museum grounds are made up of seven buildings situated on 10 acres of land. Four of our buildings are historic structures and two have Ontario Heritage Designations. Our main building is open year-round and our outbuildings are open for the season from May to October.

Visitors engage with interactive displays, like our International Drillers room, and learn our story through the interpretation of our collection of over 9,000 artifacts and a 12-minute movie called "The Spark that Ignited the World".

Visitors from all around the world tour our museum to learn our story of innovation and the contributions made by Canada's oil pioneers. They immerse themselves in historical facts about what started the modern petroleum industry.



Pembina Pipeline Corporation

Pembina Pipeline Corporation is a dynamic energy transportation and midstream provider, serving customers for 70 years.

We own pipelines that transport hydrocarbon liquids and natural gas products produced primarily in Western Canada. We also own gas gathering and processing facilities and an oil and natural gas liquids infrastructure and logistics business.

Our operations along the hydrocarbon value chain allow us to offer a full slate of midstream and marketing services to our customers in the energy industry. We have facilities in BC, Alberta, Saskatchewan, Ontario, North Dakota, and Illinois.

We're always keeping an eye out for opportunities to connect hydrocarbon production to new demand locations. These developments help ensure that hydrocarbons produced in the Western Canadian Sedimentary Basin -- and the other basins where Pembina operates -- can reach the highest value markets throughout the world.

We're proud of our 2,500+ people and our 70 years of strong performance.

Corunna is a rail and truck terminal and petrochemical storage facility located three hours southwest of Toronto. The terminal is tied into pipelines all over Ontario and Michigan and has nine active storage caverns. From Corunna, we ship propane across Eastern Canada and the U.S.

The 27 employees supervise loading and off-loading of propane for shipment via truck and rail car and operate pipelines in and out of our storage caverns.





Profire Energy

For more than 20 years we have developed new and innovative technology, increasing the efficiency and overall functionality of our burner management and combustion systems. We make dependable products, engineered by reliable people, ensuring you receive quality service every step of the way.

At Profire, we aim to provide the most innovative, safe, and performance-driven solutions in burner management and combustion controls for maximum process efficiency.

Our solutions are put to work in the upstream, midstream, and downstream sectors of the oil and gas industry, as well as utility and transmission; biogas; petrochemical and refining; metals and mining; power generation; renewables; landfill; agriculture; municipal; food and beverage; construction and infrastructure; and pulp and paper industries.

https://profireenergy.com



Securo Vision

Securo Vision is a leading provider of personal protective equipment (PPE) and workplace safety solutions across North America. Owned by Canada's largest group of optometrists, we bring unmatched expertise in vision protection and prescription safety eyewear. With the largest network of dispensing partners in Canada, we offer nationwide reach and support. Our advanced web platform streamlines program management and ensures compliance, making us the trusted choice for major organizations— including some of Canada's most recognized companies. With over 45 years of experience, Securo Vision is committed to protecting your workforce with innovative, reliable solutions.



Stream-Flo

At Stream-Flo, we believe in powering progress with our cutting-edge solutions tailored for the energy sector. Our dedication to quality, innovation, and unwavering support ensures that every project and partnership benefits from our comprehensive expertise and commitment to excellence.

From wellhead systems to gas storage solutions, our products and services are designed to meet your need today while anticipating the challenges of tomorrow. Because at Stream-Flo, your success is our mission.

Discover the Stream-Flo Difference

Visit streamflo.com to learn how our solutions can power your project's success.



Weatherford

WEATHERFORD WIRELINE

Weatherford offers a full portfolio of wireline solutions so you can gain insight into any formation, anywhere. From early field exploration to plug and abandonment, we deliver actionable data regardless of downhole conditions. Our openhole and cased-hole technologies operate in real time or memory mode to obtain the information you need. Using these proprietary technologies and conveyance systems, we help you to assess productivity, diagnose downhole issues, design an efficient completion, and inform field development and production or asset management systems. Our Reservoir Intelligence Network draws from this portfolio to create purpose-built solutions for conventional, unconventional, offshore, or heavy oil during any stage. At the well level, we optimize capital efficiency, with a focus on completion and production operations. At the field level, we provide reservoir solutions for specific challenges, from greenfields to brownfields.

- Reservoir Intelligence Network creates effective solutions using data-driven, multidisciplinary analysis.
- Openhole technologies determine asset value and set the stage for efficient production.
- Cased-hole technologies evaluate and diagnose downhole issues.
- Conveyance systems obtain a full spectrum of logs, even in complex wellbores

OPENHOLE WIRELINE

By gathering valuable information, our openhole wireline solutions guide the drilling, completion, stimulation, and production decisions that ultimately help you to optimize reservoir performance.

CASED-HOLE WIRELINE

Our cased-hole wireline solutions provide data that identifies your downhole issues, pinpoints bypassed production, and gives a hyper-accurate well-integrity assessment that helps maximize asset recovery.



Wellmaster

Wellmaster: Make a Difference with Quality and Innovation

<u>Wellmaster</u> is a trusted name in the North American and global groundwater, energy, and horticultural sectors, delivering high-performance products and innovative solutions since 1987. As a multi-generation family-owned business, we take pride in our commitment to excellence, setting the highest standards for both product quality and customer satisfaction. With a diverse range of products and services, we empower our customers to overcome challenges and pursue opportunities. We're here to Make a Difference and support your success.



EPEX & OPI Gold Volume Archives

Now in its 62st year, an extraordinary amount of valuable technical information has been presented at OPI conferences. All material from previous conferences has been archived and digitized for convenience, please enjoy.

All digitized volumes can be found online:

http://www.ogsrlibrary.com/catalogue

Presentations from EPEX 2018 - 2024 are available on the OGSR Library YouTube channel:

https://www.youtube.com/user/ogsrlibrary





Acknowledgements

Conference Chair: Peter Budd

OPI Chair: Scott Lewis

OPI Office Manager: Lorraine Fillmore

Conference Committee:

Scott Lewis Peter Budd Niki Clarke Lorraine Fillmore Jordan Clark Matt Dupont Connor Macleod Jug Manocha Rhys Paterson

Media: Matt Dupont (video) Connor MacLeod (audio recording)

MC & Moderator:

Rhys Paterson

Show AV: Jordan Clark