Renewable Geo Resources Ltd.

turning environmental challenges into economic opportunity

https://rgrl.ca/

Carbon Capture and Sequestration (CCUS)

Reducing Emissions from Deforestation and Forest Degradation (REDD)

Solar/Wind Power

Geothermal

Economic recovery and growth requires
Critical thinking for Critical times

Renewable Geo Resources Ltd. (RGRL)

Management

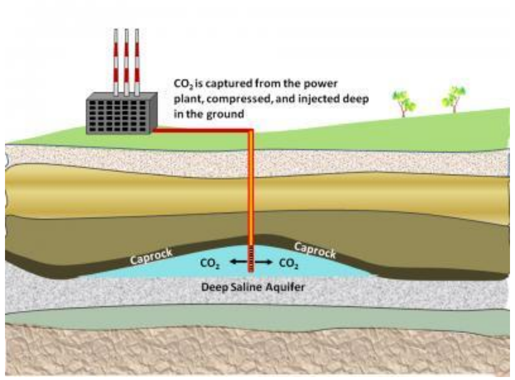
- Dr. Marc Bustin, a earth science professor at UBC in the Department of Earth, Ocean and Atmospheric Sciences with over 45 years of experience in earth and environmental science and engineering in Alberta, BC, USA and Internationally;
- Steve Mole, a professional geologist with over 42 years of practicing geological experience in Alberta, SK and BC;
- Jeremy Newton, a professional businessman and landman with over 30 years of experience building and growing private and public companies in Alberta, SK, BC and South America;
- Dr. Amanda Bustin, a professional engineer with over 15 years experience in engineering geophysics and reservoir and environmental engineering in a variety of energy and environmental projects and as a researcher at UBC in the Department of Earth, Ocean and Atmospheric Science; and
- Harry Knutson, a professional businessman with over 30 years of building and selling companies in Energy, Finance, and the Real Estate industries.

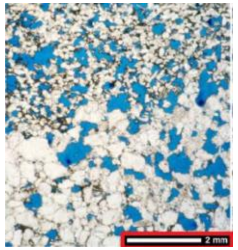
Collaborators/Partners

- Carbon Corp Management Ltd. (Dr. Robert Falls)- Experienced experts in REDD projects- evaluation and validation
- Township 50 Ltd. (Ron Brezovski)- Experienced experts in management of disposal wells
- Clinton-Medina Group Ltd. (Al Phillips, P.Geol.) – Experienced expert in Southern Ontario

RGRL Portfolio of Projects

carbon dioxide sequestration





REDD reforestation afforestation

Solar/Wind

Geothermal

Geothermal power plant by Turboden in Bavaria, Germany (source: Turboden)

Renewable Power Cost Comparison

Project	Area	Company	On Line	Cost ($MM)	$1000 per MW	POWER TYPE	Annual Generation (MW)	Installed (MW)	Baseload (MW)	Capacity Factor
Churchill Falls Dam	Churchill River	Nalcor/Hydro Que	1974	946	$237	Manitoba Hydro	35,000,000	5428	3995	74%
W.A.C. Bennett Dam	Fort St. John	BC Hydro	1968	750	$505	BC Hydro	13,000,000	2730	1484	54%
Pickering Nuclear	Lake Ontario	Ontario Power Corp.	2007	2250	$835	Ont Nuclear	23,600,000	3100	2694	87%
Bruce A & B Power	Lake Ontario	Ontario Power/TC Energy	1977	7800	$1,708	Ont Nuclear	40,000,000	6232	4566	73%
Point Lepreau Power	Point Lepreau	NB Power	1983	1400	$2,696	NB Nuclear	4,549,000	705	519	74%
RGRL ORC Geothermal	Edson/Hinton, Alberta	RGRL	2028	2344	$4,935	ORC geothermal	4,380,000	500	475.0	95%
Blackspring Ridge Wind Project	Vulcan	Greengate Canada, EnBridge	2014	600	$5,263	Wind	998,640	299	114	38%
RGRL ORC Geothermal	Edson/Hinton, Alberta	RGRL	2026	795	$5,579	ORC geothermal	1,314,000	150	142.5	95%
Travers Solar	Lomond, Vulcan 21-15-20W4	Greengate Power	2022	500	$5,682	Solar	770,880	400	88.0	22%
Airport City Solar	Leduc	Alpin Sun - European Based	2022	169	$6,402	Solar	231,264	120	26.4	22%
Ardenville Wind Farm	Fort Macleod	Trans Alta	2010	135	$6,429	Wind	183,960	66	21	32%
Darlington Nuclear	Lake Ontario	Ontario Power Corp.	1992	14400	$6,485	Ont Nuclear	19,451,000	3512	2220	63%
Robert-Bourassa Dam	La Grande RiverHydro	Hydro Que	1981	3800	$6,527	Que Hydro	5,100,000	7722	582	8%
Vauxhall Solar	Vauxhall	Solar Krafte Utilities	2022	220	$6,667	Solar	289,080	150	33.0	22%
RGRL ORC Geothermal	Robb, Alberta	RGRL	2023	57	$7,500	ORC geothermal	57,816	8	7.6	95%
Vulcan Solar	Vulcan 20-13-21W4	EDF Renewable Energy Canada	2023	155	$9,150	Solar	148,920	77	16.9	22%
Site C Dam Project	Fort St. John	BC Hydro	2025	8000	$13,741	BC Hydro	5,100,000	1100	582	53%

CCUS – the opportunity

- Canada, the USA, Europe, Norway, Australia, New Zealand, Japan, China and other countries have shifted government polices over the past 4 years to favour greener energy sources and investment with a move to lessen the world demand on traditional fossil fuel energy sources.
- Canada Federal Carbon Taxes charged on GHG Emissions escalating up to $170/tCO2 in 2030.
- GHG Reduction Projects such as Geothermal create GHG Credits to Offset GHG Taxes, and the trade of these Offset Credits is becoming a new industry across world borders.
- Various government grants and programs are available for CCUS.
- Private equity and investor groups are investing based on ESG factors- is a risk and opportunity

Geological Storage of Carbon Dioxide

Site Selection Subsurface Criteria

- Capacity – using legacy well data to identify sstorage capacity in the reservoir rock (reservoir thickness, lateral variation, continuity, porosity, heterogeneity, and water saturation).

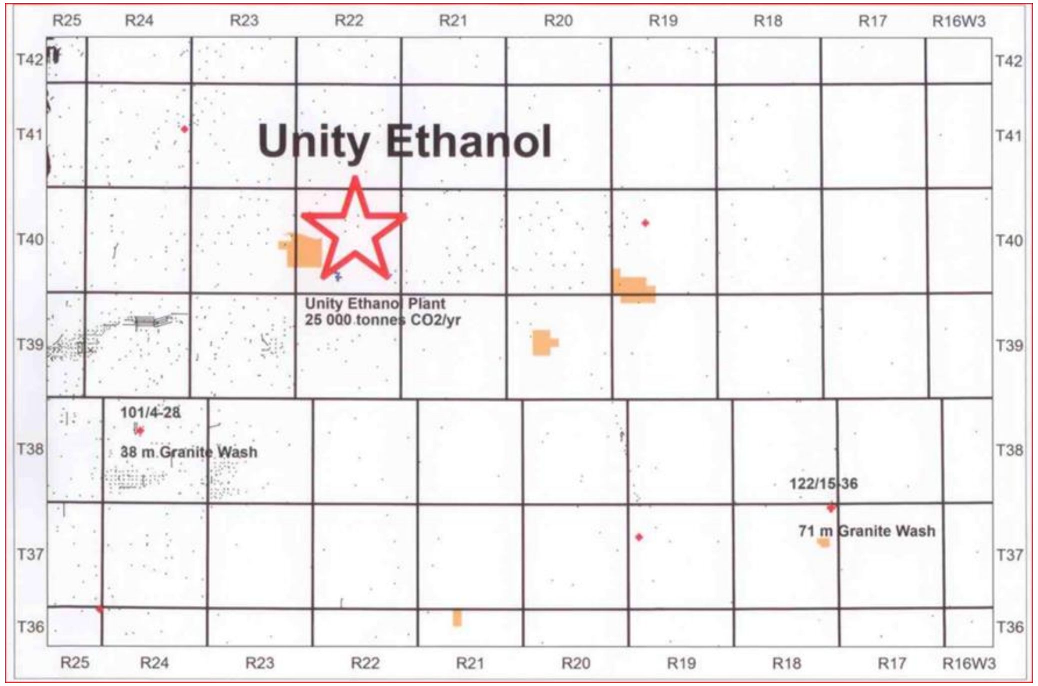
- Injectivity – using same well data to understand injection rate of CO2 into reservoir (injection pressures, injection rate from well test data, core analysis, and production/injection data).

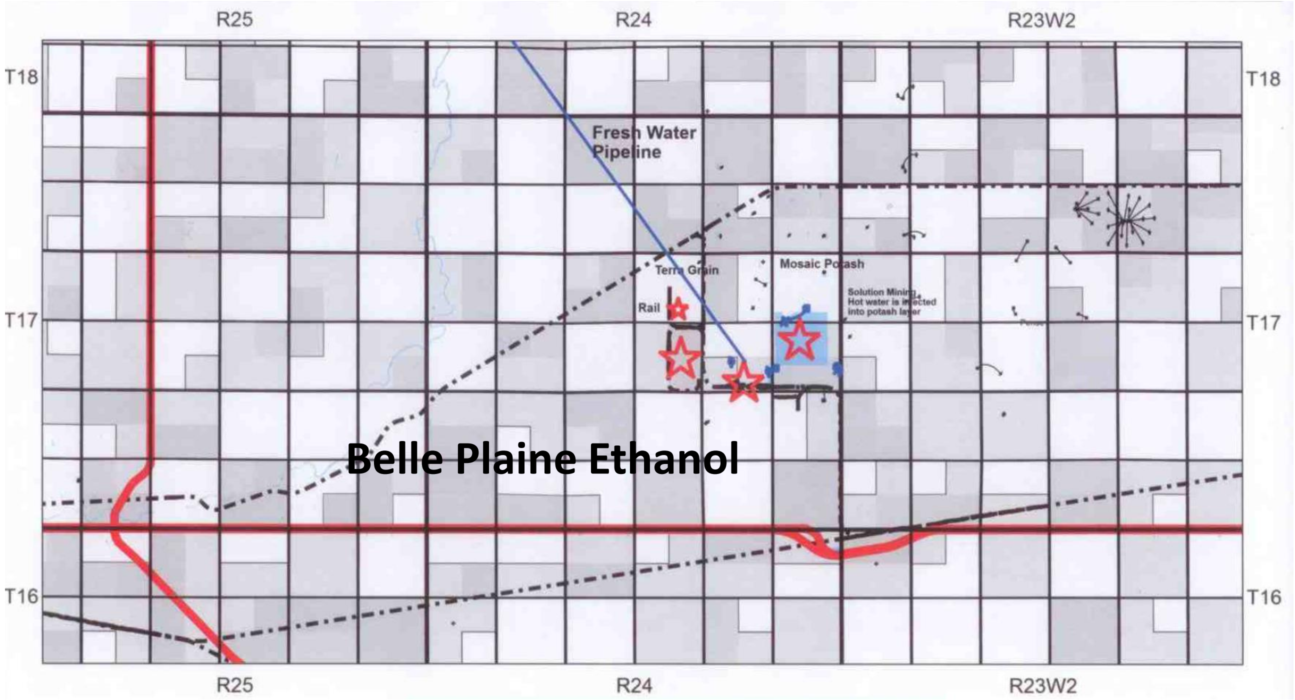
- Storage Security (potential for leakage) – regional geologic mapping to determine direction and potential trapping of CO2 plume in the reservoir, primary seals (samples and core), faults and fractures (mapping and seismic surveys) legacy wells penetrating potential storage reservoir (well status, abandonmenthistory) assessment of seismicity and tectonic activity.

- Pore Space Ownership Rights – identify pore space owners in the area of review.

- Proximity to potential effects on other subsurface activities – identify producing hydrocarbon pools, disposal operations, other stotrage operations (LNG, NG) Potable ground water.

Saskatchewan
RGRL: carbon sequestration in geological formations





Porous Deadwood Wet Sand 45 meters
Area 5 sections (1280 ha)
Sand porosity 12%
Reservoir T & P 60oC & 21.5 MPa (from DST) @ 2100 meters
Reservoir Capacity: 10,000 x 45 x 1280 x 0.12 = 69.1 Mt
Ethanol plant: 0.15 Mt/yr x 25yrs = 3.75 Mt (use 0.5 Mt CO_2/yr for ethanol and potash industrial processes)
Storage: 3.75/69.1 = 5.4% (12.5/110 = 18.1%) of the Deadwood brine would be displaced over 25 years.

Cambrian Isopach Southwestern Ontario

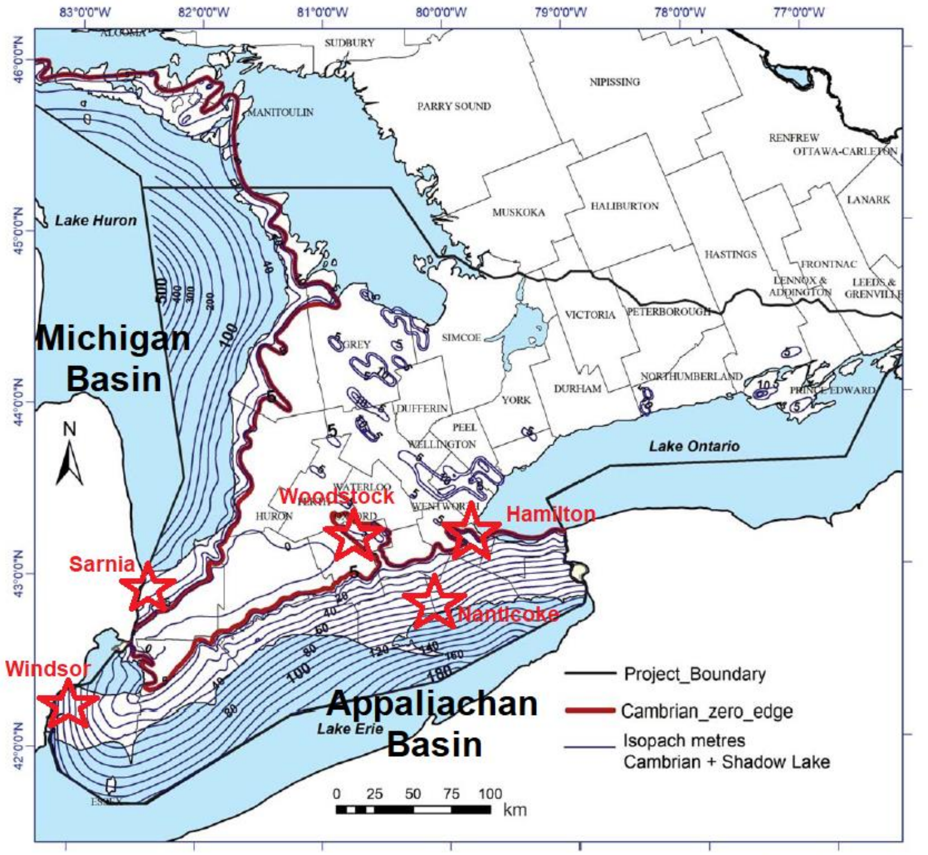


Figure 23. Isopach map of the combined Cambrian formations and Shadow Lake Formation and zero edge of the Cambrian strata, compiled from Sanford and Quillian (1959), Bailey Geological Services Ltd. and Cochrane (1984), Trevail (1990) and Ontario Geological Survey (2011). The Shadow Lake Formation underlies all southern Ontario except for a small area in Lambton and Middlesex counties. Cambrian units do not subcrop within the study area. Contour spacing is variable.

from: Carter et al (2021)
Geoscience Canada v.48

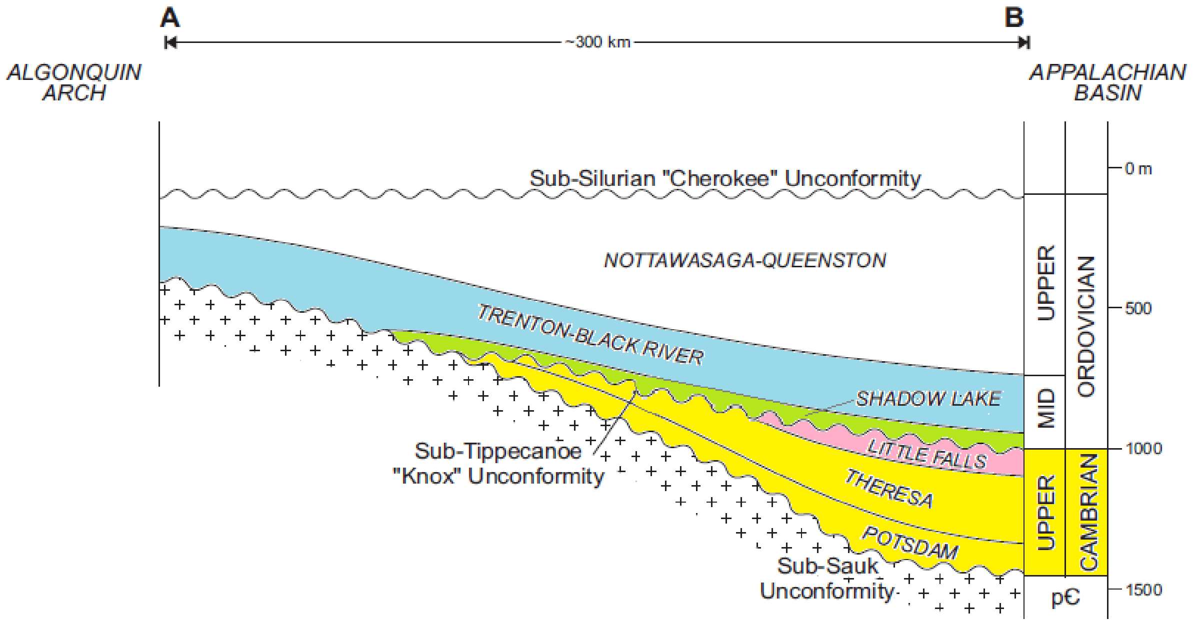


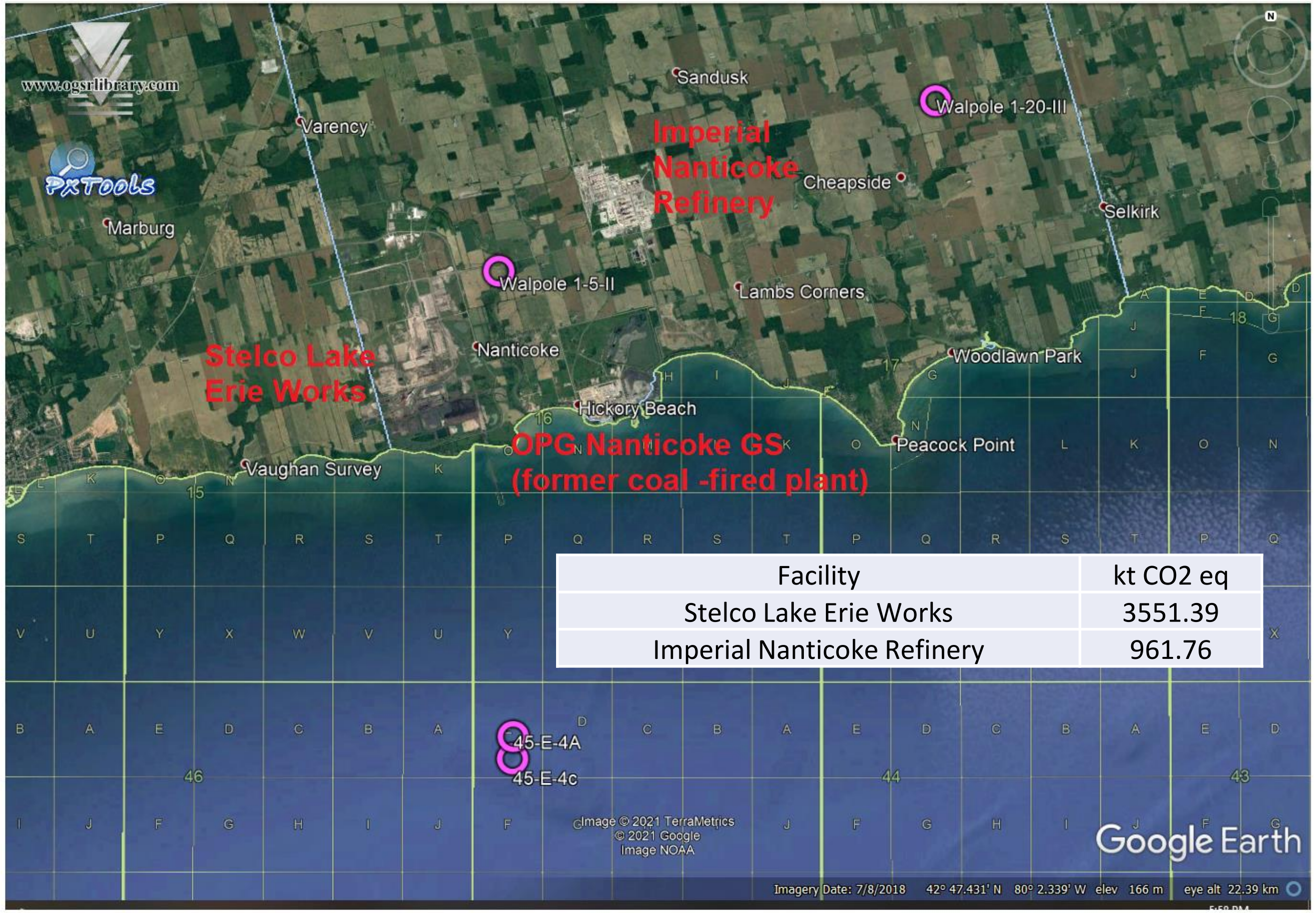
Figure 1. Distribution of Upper Cambrian strata of Southwestern Ontario, and outcrop and core locations (modified from Sanford and Quillian, 1954; Poole et al., 1968; Hamblin, 1998b)

modified from Hamblin 2011

Nanticoke CO2 Emitters

US Steel's Lake Erie Works plant works at Nanticoke, Ont., on Sept. 3, 2011. THE CANADIAN PRESS/Stephen C. Host

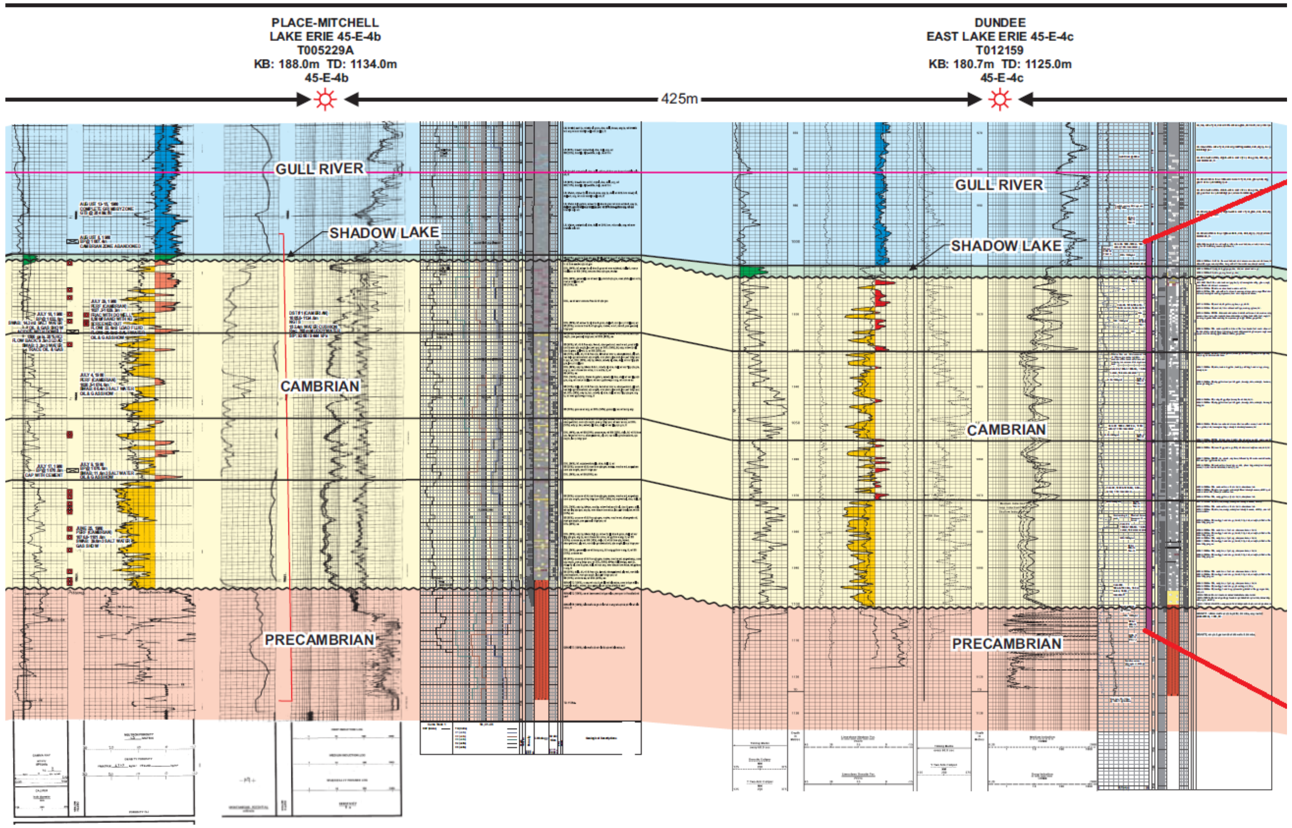
Government of Canada GHG emissions (2019)



Facility	kt CO2 eq
Stelco Lake Erie Works	3551.39
Imperial Nanticoke Refinery	961.76

https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions/large-facilities.html

Well Logs Cambrian Reservoir in Nanticoke Area



Two well cross-section Nanticoke

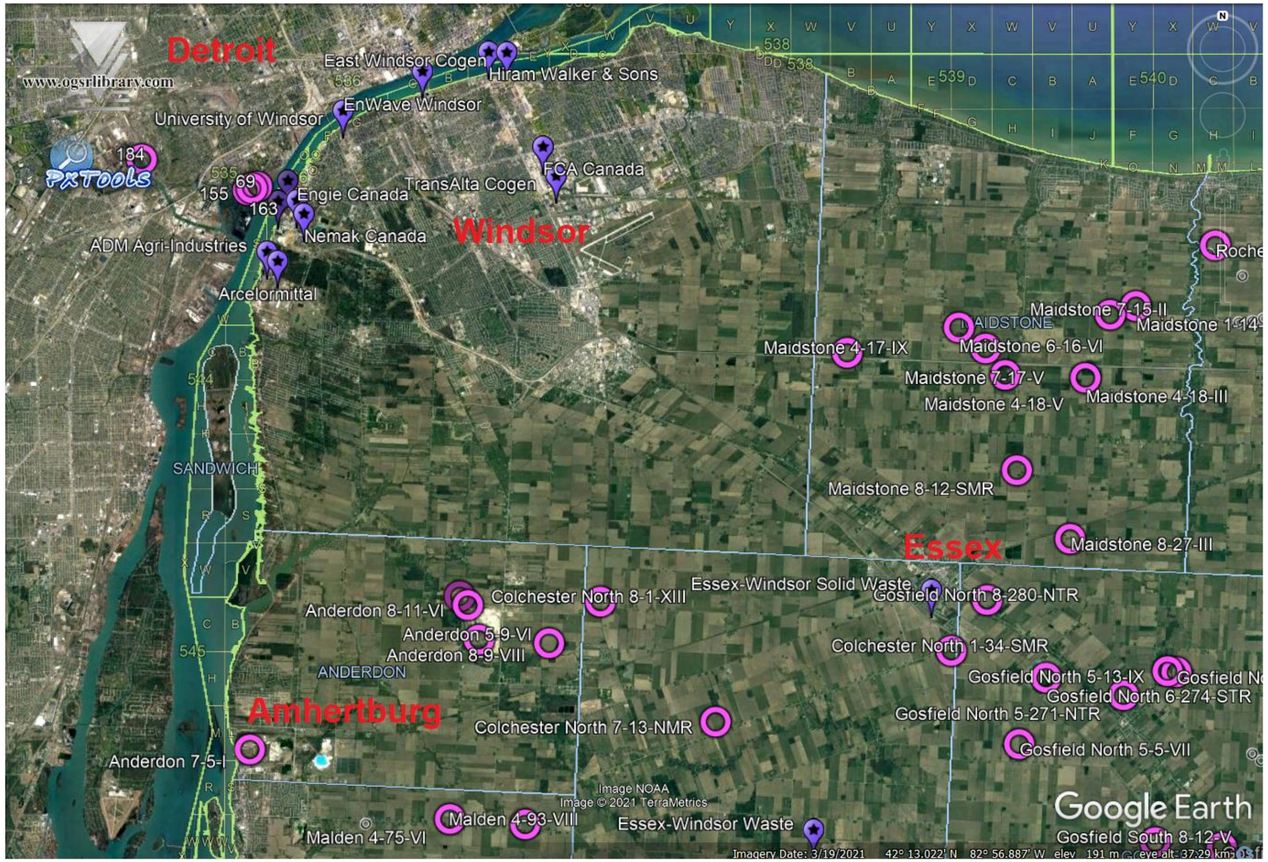
- Focusing on Cambrian dolomite and sandstone section at 1009.3 -1100.4m as a potential CO_2 storage reservoir.
- Top Seal is the overlying Ordovician Shadow Lake Shale and dense Gull River limestones.
- Underlying Precambrian crystalline granitic basement forms the bottom seal.
- Well log, core and drill cuttings data identify the and quantify the capacity in this reservoir.
- The well test data quantify injectivity potential and permeability in this reservoir.

Windsor CO2 Emitters

Atura Power Brighton Beach Natural Gas Fired Generating Station

Government of Canada GHG emissions (2019)

Facility	kt CO2 eq
Essex-Windsor Regional Landfill	232.83
Essex County Landfill No. 3	112.38
ADM Agri-Industries Windsor Plant	73.17
FCA (Fiat Chrysler) Auto Plant	67.73
Hiram Walker & Sons Distillery	65.35
K+S Windsor Salt Plant	44.68
Brighton Beach Gas Fired Generating Plant	38.18
Arcelormittal (Dofasco) Windsor Steel Plant	28.60
University of Windsor	26.33
East Windsor Cogeneration Centre	23.69
Nemak Windsor Aluminium Plant	23.67
Engie West Windsor Power Plant	15.05
Enwave District Energy System	13.29
Windsor Essex Cogeneration Plant	10.96

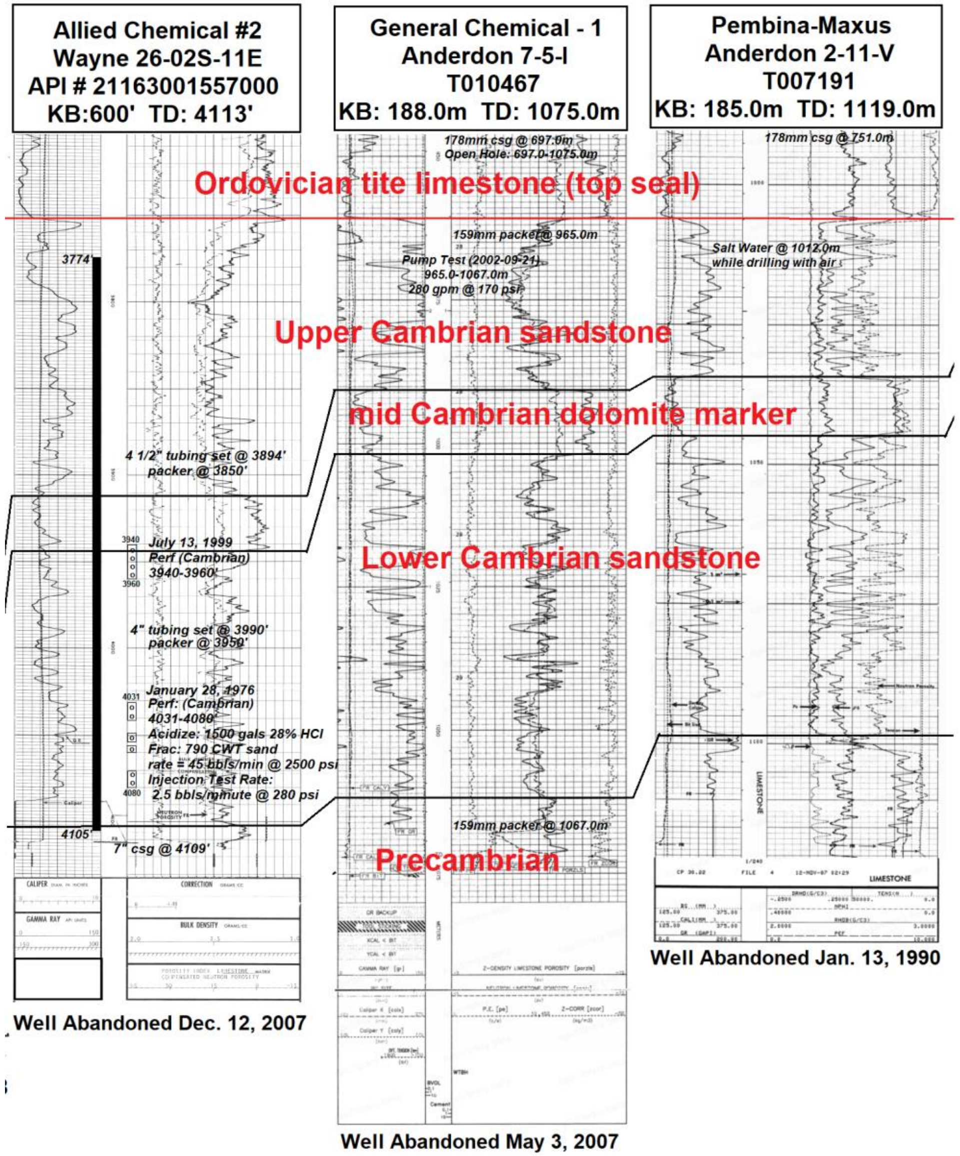


https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/greenhouse-gas-emissions/large-facilities.html

Well Logs Cambrian Reservoir in Windsor Area

Three well cross-section in Windsor

- Focusing on Cambrian dolomite and sandstone section at 960-1100m (3150-3610’) as a potential CO2 storage reservoir.
- Top Seal is the overlying Ordovician Shadow Lake Shale and dense Gull River limestones.
- Underlying Precambrian crystalline granitic basement forms the bottom seal.
- Well log, core and drill cuttings data identify the and quantify the capacity in this reservoir.
- The drill-stem test and injection test data quantify injectivity potential and permeability in this reservoir.



RGRL: REDD (forestation and afforestation opportunities)

- RGRL is entering into a collaboration with Carbon Corp. Marketing to quantify and validate carbon credits for the volunteer and compliance markets on select opportunities

- RGRL is currently in negotiation with a large North America environmental NGO and in talks with Canadian first nations with respect to supporting forestation or afforestation opportunities with the view of participating in the carbon offsets

Solar/Wind Power

Major companies (ie Cenovus, Amazon) are investing in solar and/or wind installations mainly in southern Alberta to offset Scope 1 and Scope 2 Credits

Photo by Pixabay on [Pexels.com]

picture from https://www.todayville.com/alberta-has-an-opportunity-like-never-before/

RGRL: Solar/Wind Power project areas

- RGRL has ownership access to surface rights in Alberta at two locations each of 160 areas.
- One suitable for solar only and the second suitable for wind and solar.
- Currently investigating grid access and zoning.

Geothermal

Geothermal energy provides the opportunity to produce greenhouse emission free, base load power, however to date there is no geothermal energy produced in Canada and existing projects under consideration are challenged by temperatures that are marginal and/or fluids production rates that are limited for existing technologies. Based on our analyses and mapping of existing petroleum exploration boreholes we have identified reservoirs with fluids at suitable temperature and composition and with proven fluid deliverability's from tests that can be exploited as scale for geothermal energy using a novel blend of technologies. The assembled consortium of technology providers, oil and gas producers and geothermal facility specialities will undertake a front-end engineering design (FEED study) that will simultaneously evaluate the two competing technologies for electricity generation (organic rankine cycle and the Kalina cycle). As part of the FEED study the reservoir will be fully characterized and modeled for geothermal energy production and drilling and completion and pump design options evaluated. The study will further explore the use of waste heat for industrial purposes and the potential for recovery of lithium and other elements of value know to be present based on fluid analyses.

RGRL: Alberta Geothermal Project Areas

Edson-Hinton, Alberta

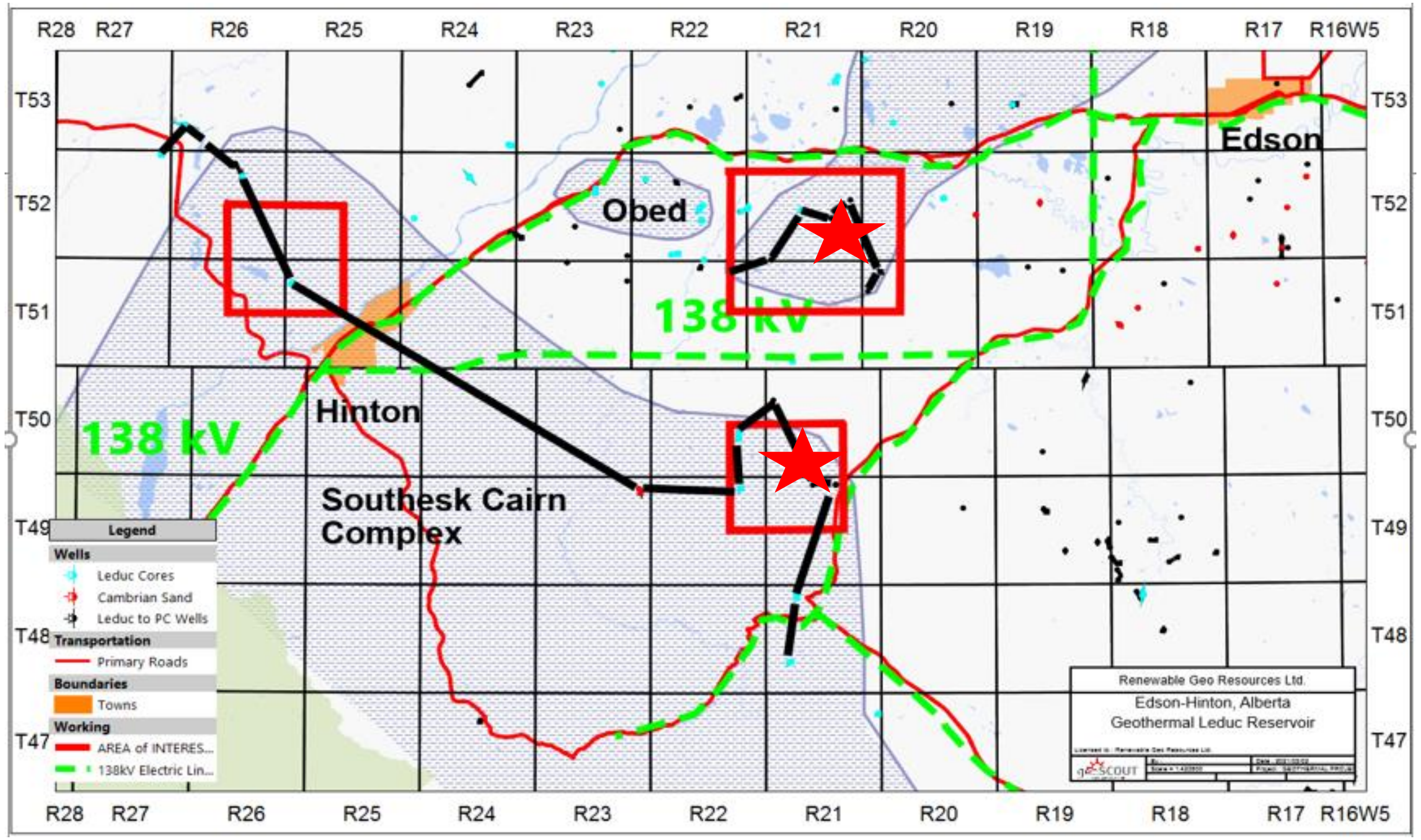
Reservoir: Leduc/Swan Hills dolomite with an 80m porous wet section. Depth is 4700 meters. Temperature is 165°C. Porosity 5-12%, permeability 10-100md, fractured. DST analysis: 5,000 bwpd (up tubing). Salinity of brine is 280,000 mg/l. Lithium concentration is 120 mg/l. Reference well: 10-34-49-21W5. Close to infrastructure.

Flow Rate Required 15,000 bwpd per 1MWe (120,000 bwpd/8MWe gross).

Project focused on base load electrical power generation and direct heat uses (pulp & paper, solid wood, greenhouses, industrial parks).

Proximal to Electrical Grid. Existing 138 kV line at location.

Edson Area, Alberta.
Preferred Target Areas



Sizing and Cost Assumptions for Facilities

ORC/Kalina Geothermal Plant Capital Costs				
	8 MW	**150 MW**	**500 MW**	
Plant Size (MW)	8	150	500	
Brine Required (bbls/d)	60,000	1,125,000	3,750,000	
Producing Wells	3	56	188	The number of wells to produce the required volume of brine
Injecting Wells	2	38	125	The number of wells to inject the required volume of brine
Total Well Cost ($m)	$25,000	$375,000	$1,093,750	Pilot 8 MW well cost=$5,000,000/well 150 MW plant=$4,000,000/well 500 MW plant=3,500,000/well
Surface ORC/Kalina ($m)	$24,000	$270,000	$750,000	Pilot plant=$3,000/kW 150 MW plant= $1,800/kW 500 MW plant=$1,500/kW
Construction ($m)	$8,000	$120,000	$350,000	150 MW plant construction cost is 80% of the Pilot plant/MW 500 MW plant construction cost is 70% of the Pilot plant/MW
Total Cost ($m)	$57,000	$765,000	$2,193,750	
Cost per Base Load MW ($m)	**$7,500**	**$5,368**	**$4,618**	95% of the Installed Elestrical Power (MW) will be the Base Load Electrical Power (MW) for Geothermal Power Plants
* Well and Facility costs are estimated, to be verified by FEED study				

Potential Strategic Element Recovery from Brines used in the Geothermal Project

In addition to the high temperature of the Devonian brines in our project areas necessary for generating geothermal energy the brines have been sampled to contain various quantities of strategic elements such as: Ca, Mg, K, Li, Br and I. There are several successful pilot projects underway to extract Li from similar brines around the world.

Stratigraphic unit	Ca	Mg	K	Li	Br	I
Devonian						
Wabamun Gp.	30 000	11 300	10 000	115	*	*
Winterburn Gp.	30 000	5000	8600	90	1880	38
Woodbend Gp.	39 000	8000	10 000	140	2115	53
Beaverhill Lake Gp.	98 000	13 500	19 000	130	2785	50
USD/tonne (Mar21)		$4,630		$10,500	$5,300	

* = all formation water analyses below respective regional exploration thresholds (see Table 1).
From Hitchon et al. (1993, Table 13).

RGRL: Way forward

Short term objectives:

- move forward with acquisition of subsurface sequestration space targeting industrial sites paired with suitable reservoir

Sign a MOU with respect to REDD opportunities

Short term funding needs:

- will require minor funding for tying up space in Saskatchewan (50-100K)
- will require significant funding (demand basis) for leasing freehold reservoir space (assume minimum up front lease fees ramping up when disposal initiated)