Developing the Future of Salt Mining and Hydrogen/Energy Storage in Atlantic Canada

CSE: VRTX | OTC: VTECF | FRA: AA3

2025 Corporate Presentation

Vortex Energy
Overview

Developing a clean future through salt, hydrogen storage & CAES cavern storage

Vortex Energy strives to innovate the future of global hydrogen storage, transportation, and CAES storage through the advancement of its salt assets.

- CAES Cavern Storage – *Vortex Energy is evaluating the use of its salt caverns for CAES (Compressed Air Energy Storage), offering a scalable, long-duration solution to support grid reliability and renewable energy integration.*
- Hydrogen Cavern Storage– *The Robinsons River's East and West Potential Salt Structures are among the largest identified storage caverns on Canada's East Coast, with the potential to store up to 800,000 tonnes of hydrogen across more than 60 caverns.*

Investment Highlights

Vortex Energy is harnessing its large-scale salt assets to develop next-generation hydrogen storage and compressed air energy solutions for the rapidly expanding clean energy market.

Salt Structures on the Property

- Two large scale potential salt structures identified through **gravity** and **seismic exploration.**

Salt Market

- In 2024, the U.S. salt market was valued at **USD 7.1 billion,** with consumption totaling around **50 million tons.**

Compressed Air Energy Storage Market

- The global compressed air energy storage (CAES) market is valued at **$5.3 billion** in 2024 and is projected to grow to between **$35.1 billion** and **$41.7 billion by 2034**, driven by a CAGR of 22.9%.

Green Energy Infrastructure

- The East Coast of Canada has become an epicentre of green energy garnering **international investment.**

Globally Recognized Team with Regional Ties

- Comprised of **experts in salt, cavern storage, government and policy** that can help shape the emerging landscape.

Access to Global Markets

- Ideally located to **service international markets** including Europe and Asia with exceptional road, power, and port access.

Source: Index Box
Market Research Future

Vortex Energy

Compressed Air Energy Storage (CAES) Overview

The global compressed air energy storage market size was anticipated at $5.3 billion in 2024 is expected to grow to between $35.1 billion and $41.7 billion.

CAGR of 22.9% from 2025 to 2034

Market.us

Key drivers of CAES market growth include the rising integration of renewable energy sources like wind and solar, increasing demand for grid stability, and technological advancements improving efficiency and scalability.

Market Research Future

CAES provides a reliable, long-duration energy storage solution that supports grid stability, balances intermittent renewable power like wind and solar, and offers high efficiency with minimal environmental impact.

Research and Markets

As global grids shift toward decentralization and clean energy integration, CAES is emerging as a key solution for delivering flexible, large-scale storage that supports energy security, peak demand management, and industrial decarbonization.

Research and Markets

Why Salt

Halite / Road Salt

- According to Fortune Business Insight, the global industrial salt market size was valued at $25.98 billion in 2024, with global industrial salt market forecast expected at a CAGR of 4.3% from 2025 to 2032.
- Canada (3 MT) and the US (13 MT) are importing a combined 16 million tonnes of de-icing salt

Salt's Economic Impact in North America

- The total value of salt sold or used in North America was estimated to be $5.78 billion.

Market	Value	Applications
Commercial Salt	$720 million	Water treatment, drilling fluids, infusion, dialysis solutions, pharmaceuticals
Chemical Use	$220 million	Chlorine, poly vinyl chloride
Road De-Icing	$220 million	Winter road maintenance, commercial users, private households
Food Industry	$300 million	Food processing, baking industry, condiments & preservatives

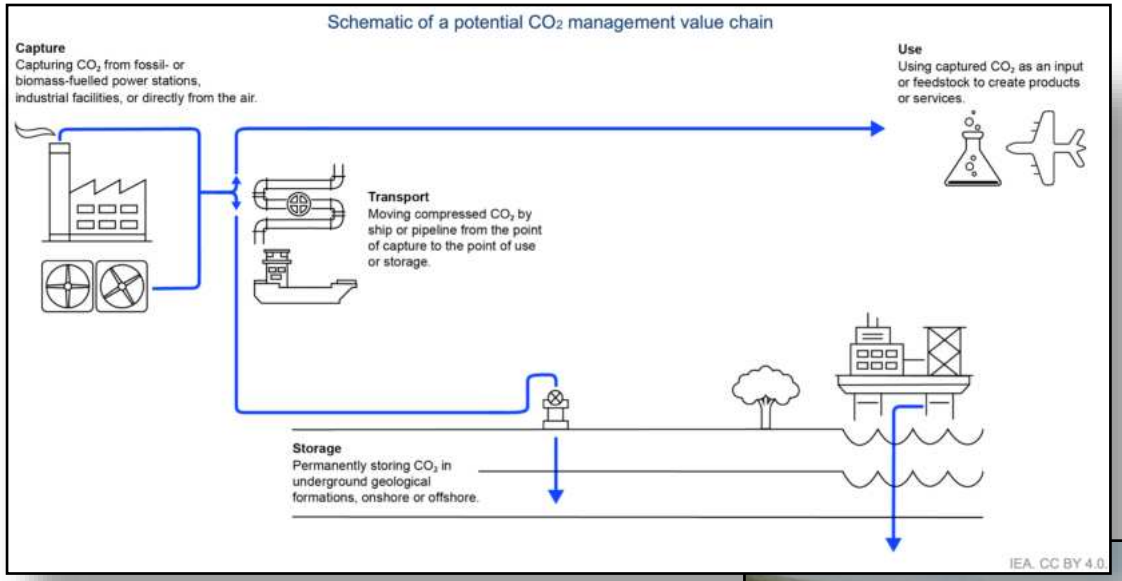
Source: https://pubs.usgs.gov/periodicals/mcs2020/mcs2020-salt.pdf
https://www.expertmarketresearch.com/reports/north-america-salt-market

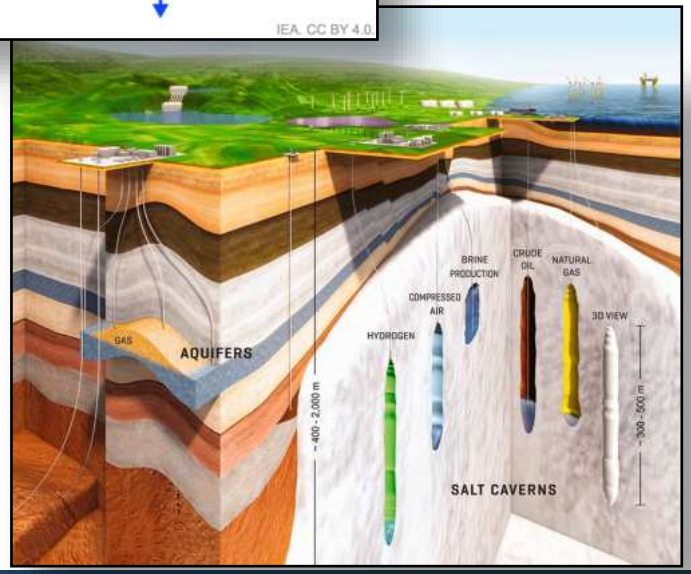
Salt Cavern How it Works

1) Salt Caverns can be constructed in naturally occurring thick salt domes, deep underground

2) Salt Caverns are a proven medium for energy and CO_2 storage as salt acts as a natural sealant

3) Salt caverns for gas storage use are formed with a leeching process by pumping hot water to dissolve the salt and removing the brine via a single well (i.e. solution mining), which then serves for energy or CO_2 injection

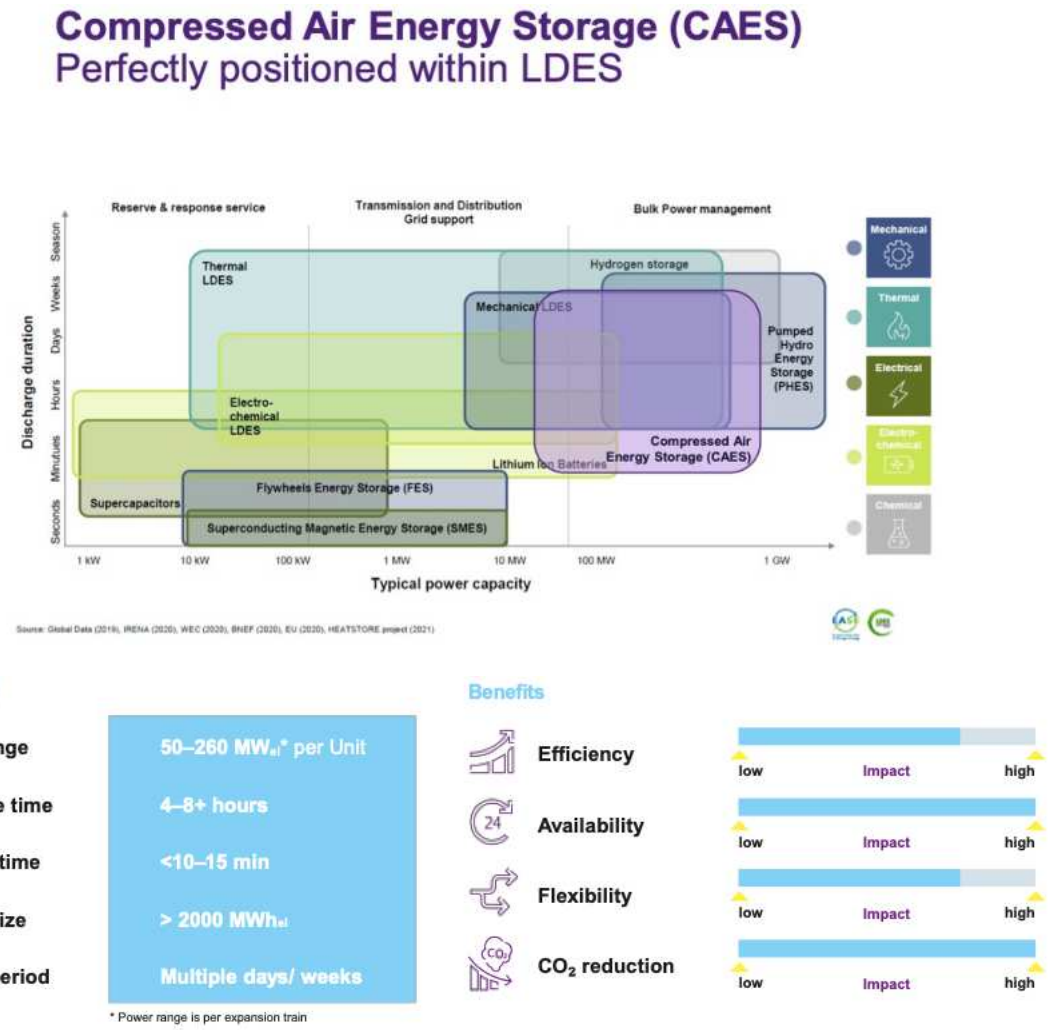




Source: https://www.iea.org/reports/about-ccus
Source: https://ogst.ifpenergiesnouvelles.fr/articles/ogst/pdf/2005/03/shi2_vol60n3.pdf

Compressed Air Energy Storage

- Increased Grid Stability
  - Increased grid capacity utilization, balancing and reserve services to support emerging hydrogen & energy market
- Adiabatic CAES
  - Delivers affordable energy storage with attractive specific capacity costs on the market - free of CO2 and NOx emissions
- Domal Salt Structure
  - Domal salt structures are preferred over bedded salt.
- Partnerships
  - Vortex is actively evaluating strategic OEM partners for A-CAES solutions



Source: Siemens Energy

Hydrogen Market Overview

1,000 MW

The Advanced Clean Energy Storage project in Utah is aiming to be the world's largest energy storage facility for 1,000 megawatts of clean power but utilizing hydrogen in salt caverns.

Source: CNBC Powering the Future 2020

International

Canada and Germany agreed to build a new hydrogen supply chain across the Atlantic Ocean, the 2025 target date is for the first shipments across the Atlantic.

Source: CBC Hydrogen Alliance Formed as Canada, Germany Agreement on Exports

642 TWh

Global Hydrogen Storage portfolio to meet the global electricity and transportation storage required based on the vehicle, ship and plane assumptions

Source: Tesla, Master Plan Part 3

$11 Trillion

The Hydrogen industry will generate $4 trillion if revenue from products such as fuel cell vehicles are counted – with the total market potential reaching $11 trillion by 2050.

Source: Bank of America

World Energy GH2 and Vortex Energy Partnership

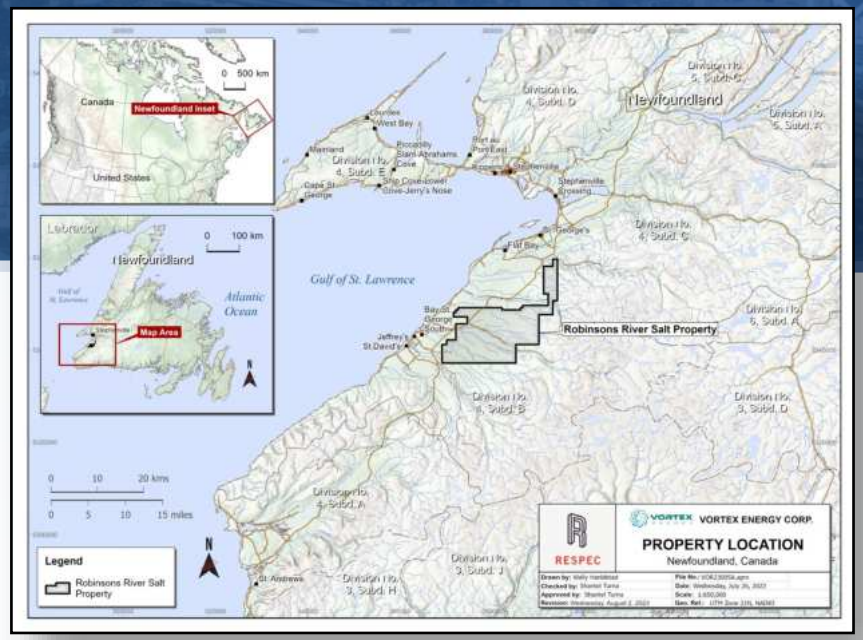
May 13, 2024 – Vortex and World Energy GH2 partner together to explore Hydrogen and Green Energy solutions in Newfoundland & Labrador.

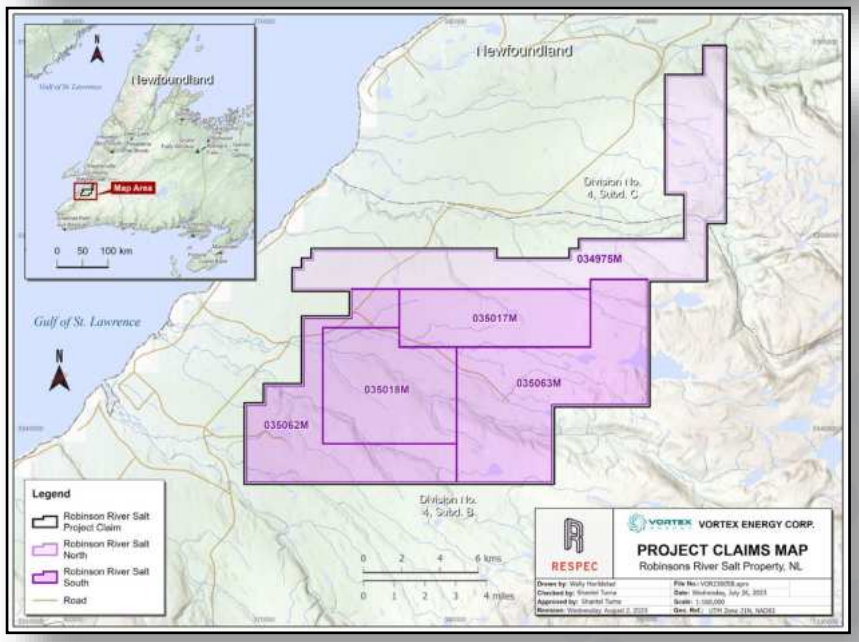
- Both parties have recognized the immense potential of Newfoundland & Labrador as a hub for renewable energy development
- World Energy and Vortex have agreed to leverage their collective expertise, resources, and technologies in the pursuit of sustainable energy storage solutions.
- Through collaborative research, development, and deployment initiatives, World Energy GH2 and Vortex Energy Corp will work together to study and explore scalable and efficient storage solutions

The Robinsons River Project

Robinson River Project

- 943 CLAIM UNITS – 23,500 HECTARES
- The Property is located approximately 35 linear km south of the town Stephenville in Newfoundland on the west coast of the island.
- Stephenville has a population of 6,600 and is the service centre for a catchment area of 25,000
- The population of Newfoundland and Labrador is 531,948
- Excellent access to highway and road access, power, and infrastructure





Location & Infrastructure

Accessibility

Access to the property is best achieved traveling south from the junction of the **Trans Canada Hwy 1** and NL-490 for 34 km. The Robinsons River Road provides access through the central part of the Property. Farther south along Trans-Canada Highway 1, Camp 180 Road provides access to the southwestern part of the Property. Numerous trails and logging roads provide a network of access with the confines of the Property.

Stephenville Community

The closest community of substantial size is Stephenville, Newfoundland 58 km by road to the southwest. The population of Stephenville is approximately 6,600 with a full-service community. Services include accommodation, food and restaurants, a 42-bed hospital, fuel, government services an airport and year-round ice-free port. The Stephenville Airport is located 1.9 km southeast of town.

Port Access

Year-round marine shipping is maintained and operated via deep water ports at Stephenville (Port Harmon) and St. Georges (Turf Point Port). These facilities have ample infrastructure to ship aggregates. The Turf Point Port is capable of loading Handymax (30-40,000 tonnes) and Handysize (<30,000 tonnes) bulk ship carriers.

Skilled Workforce

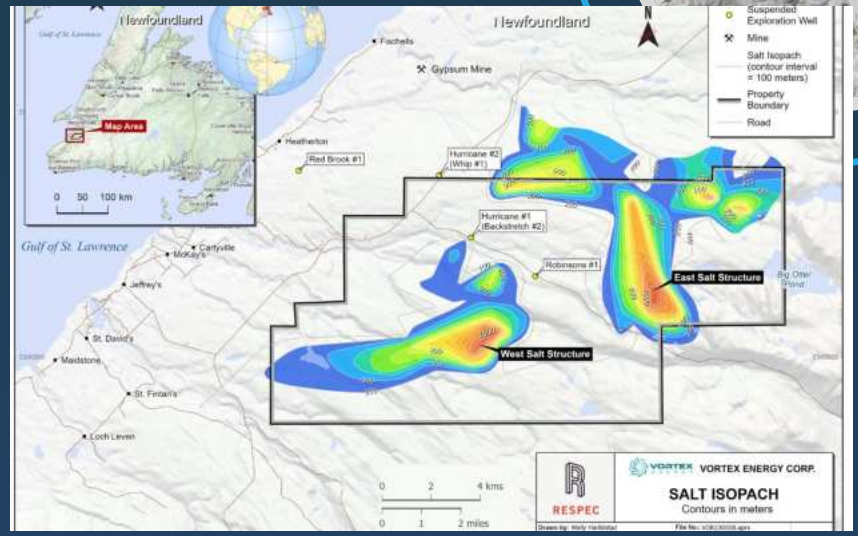
Experienced workforce can be expected from the surrounding communities of Stephenville, Deer Lake and Corner Brook.

Property Geology

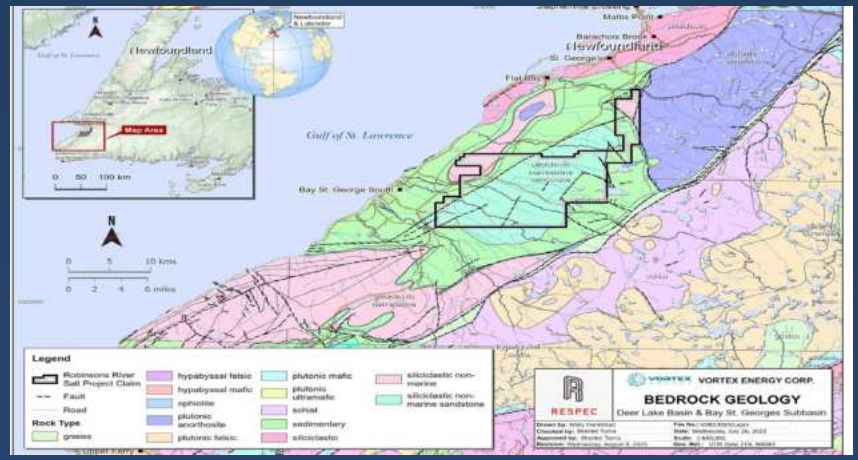
Property is hosted within the **Bay St. Georges Subbasin (BSGSB)** and is broadly analogous to the geology of the **Maritime Basin in New Brunswick**.

The Property warrants further exploration as a result of the following:

- The Property lies within the BSGSB, the host of economic-evaporite deposits;
- The Robinsons #1 drill hole confirmed the favourable stratigraphy to host evaporite deposits within the BSGSB;
- The updated geophysical interpretations on the Property have identified two major potential salt structures by their anomalous density lows, which are primary exploration targets;
- The mining of the deposits, depending on the quality of the salt, has the potential for direct commercial use and sale, including road salt or consumption as table salt with minimal mining processing; and
- The potential for cavern placement and hydrogen storage refining requires understanding the host rock formation's quality, thickness and deformation properties. By advancing exploration efforts to include drilling the identified potential salt structure, the capacity for hydrogen storage can be better defined.



Robinsons River Salt Project, Salt Thickness Map, Newfoundland



Location Map of the Robinsons River Salt Property, Newfoundland

Vortex Energy Intersects Salt

The first occurrence of salt rock occurred at a depth of 581.5 meters at the Western Salt Structure which can potentially hold an estimated amount of 250,000 tonnes of hydrogen in more than 25 caverns.

Latitude	Longitude	Final Well Diameter	Azimuth at 608 m	UTM	Dip at 608 m
N48° 12.794'	W58° 38.349'	75.7 mm	308°	21 U 0378233E 5341299N	(-87.8°)

Highlights:

- Core samples were extracted from the ground surface down to 608 meters.
- The core ranging from 530 meters to 608 meters has undergone detailed logging and analysis
- The University of Alberta was provided with selective samples to investigate the possibility of building hydrogen storage caverns.

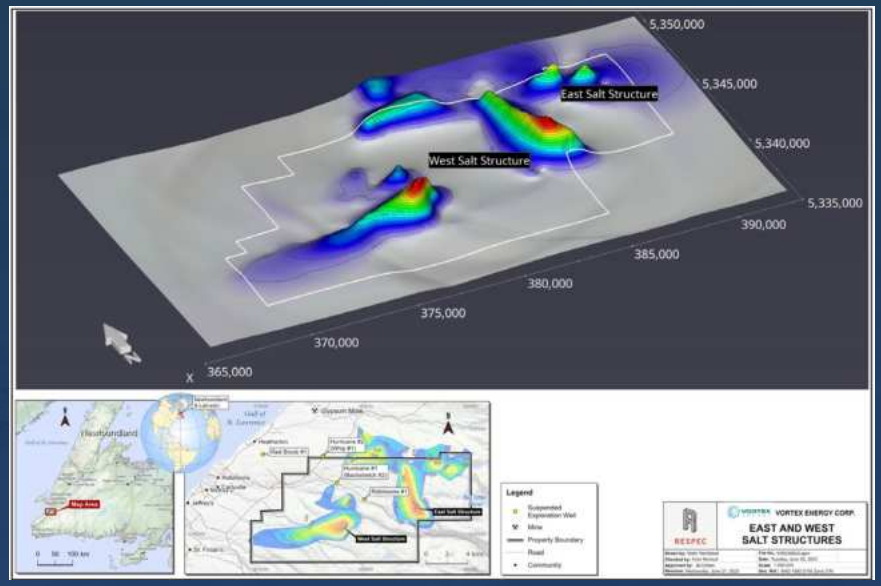
Phase 1: 2023 Exploration Program

Historical seismic and recent gravity surveys have located at least two major potential salt structures that may be suitable for road salt exploration and hydrogen cavern development at the Robinsons River Project, Newfoundland

Each potential Salt Cavern if developed could exceed a storage volume of over 2 million meters^3

Highlights:

- Seismic and gravity surveys have located potential salt structures on the property.
- Salt caverns exceeding a storage volume of 2 million m^3 per cavern can be developed.
- At least two major potential salt structures that are potentially suitable for cavern development are identified within the property.
- The maximum thickness of the structure is identified to be 1,700-1,800 meters in both gravity features.



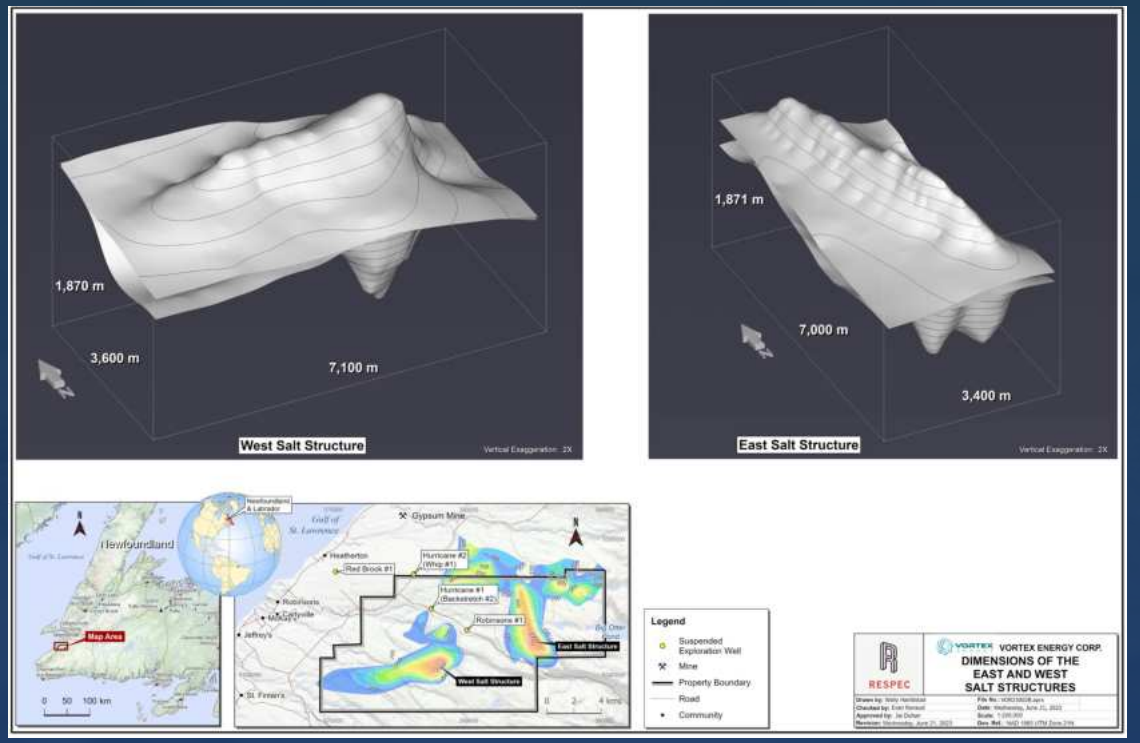
Three-Dimensional Isopach Map Showing the Thickness of the East and West Salt Structures in Robinsons River Salt South.

3D Geological Model

Based on available geophysical information, the East and West Structures have a conservatively-estimated **potential combined hydrogen storage capacity of up to 800,000 tonnes** within more than 60 caverns.

- **East Salt Structure:** Can potentially hold an estimated amount of (1) 550,000 tonnes of hydrogen in more than 35 caverns, based on conservative estimates and up to (2) 900,000 tonnes of hydrogen in more than 53 caverns, using optimistic estimates.
- Using conservative estimates, the hydrogen storage capacity is more than 70 million m^3.

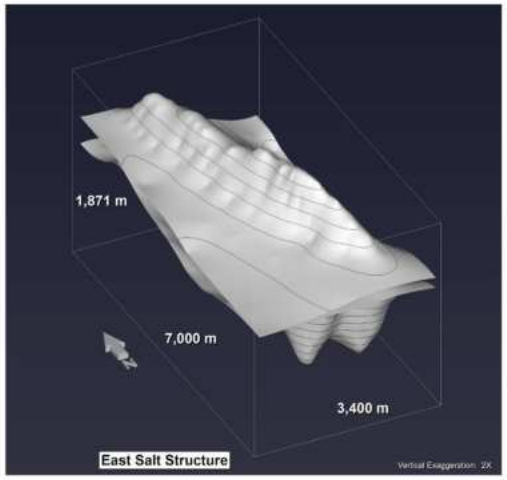
- **West Salt Structure**: Can potentially hold an estimated amount of (1) 250,000 tonnes of hydrogen in more than 25 caverns, based on conservative estimates and up to (2) 350,000 tonnes of hydrogen in more than 43 caverns, using optimistic estimates.
- Using conservative estimates, the hydrogen storage capacity is more than 50 million m^3.

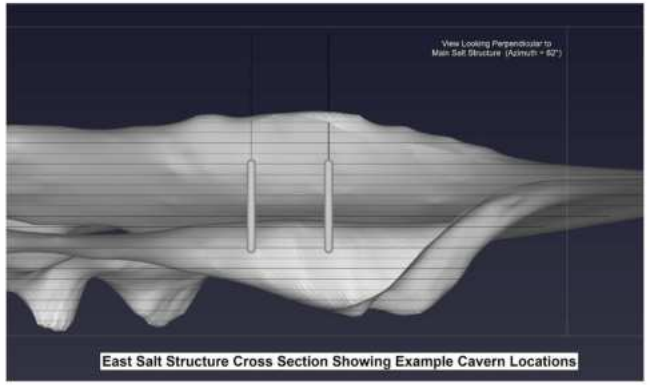


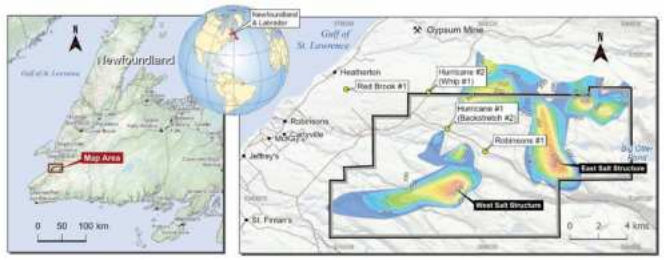
Dimensions of the East and West Salt Structures in Robinsons River Salt South.

3D Geological Model
East & West Salt Structure

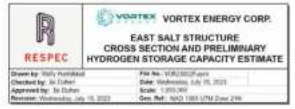
East Salt Structure



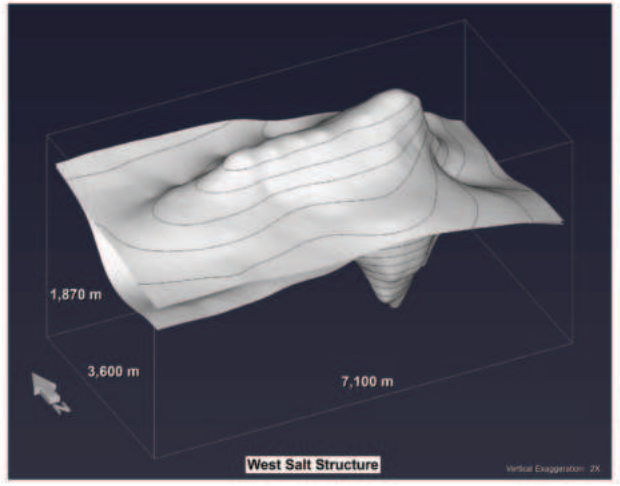


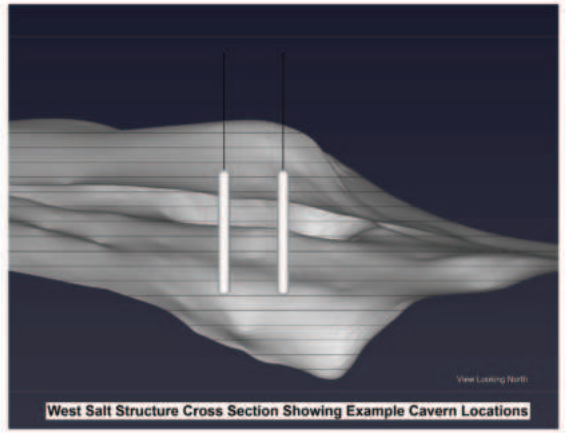


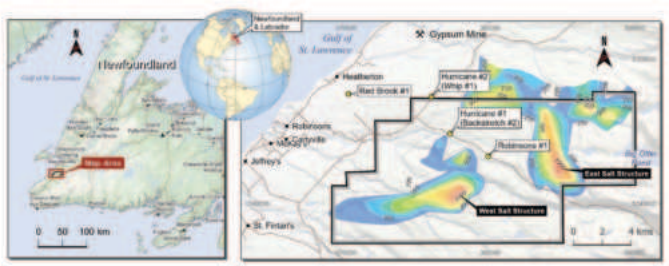
The preliminary geological interpretation results reveal that the East Salt Structure has the potential to hold more than 35 caverns within the core of the salt dome, which can potentially provide a total hydrogen storage capacity of more than 550,000 tonnes.



West Salt Structure





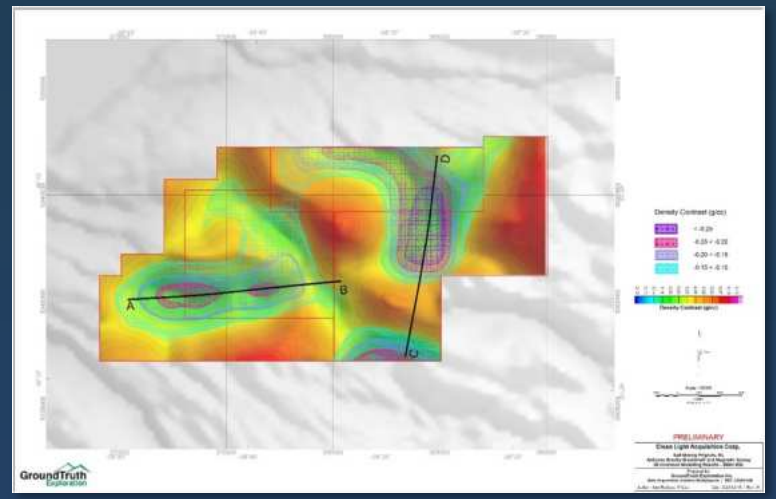


The preliminary geological interpretation results reveal that the West Salt Structure has the potential to hold more than 25 caverns within the core of the salt dome, which can potentially provide a total hydrogen storage capacity of more than 250,000 tonnes.

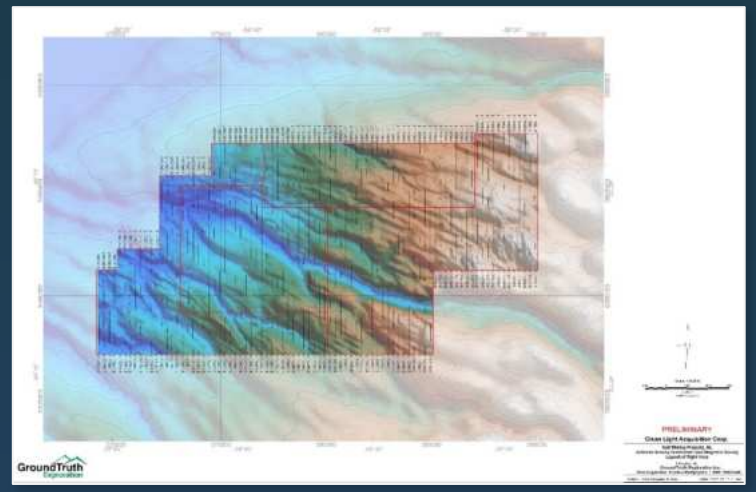
Gravity & Magnetic Survey Data

Recent completion of an airborne gravity gradiometer and magnetic survey and 3D inversion modeling over the Property.

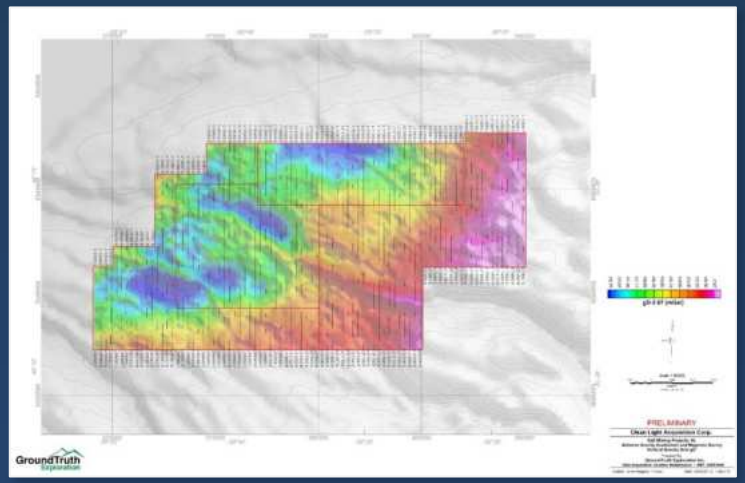
The preliminary gravity data with a terrain correction applied at a density of 2.67 g/cc was used for inversion modeling. The data was provided in the Geosoft database and a gridded format with a 62.5 (m) grid size (see Figure 4). Topography is included in the inversion as depicted in Figure 3. The models are produced using the UBC-GIF inversion GRAV3D code.



3D perspective view looking northeast of iso-surfaces beginning <-0.20 with 0.05 (g/cc) intervals created from inverted density contrast model (unit g/cc). The extracted cross-sections of density contrast models are superimposed.



Digital terrain model supplied by Xcalibur for the inversion with flight line paths.

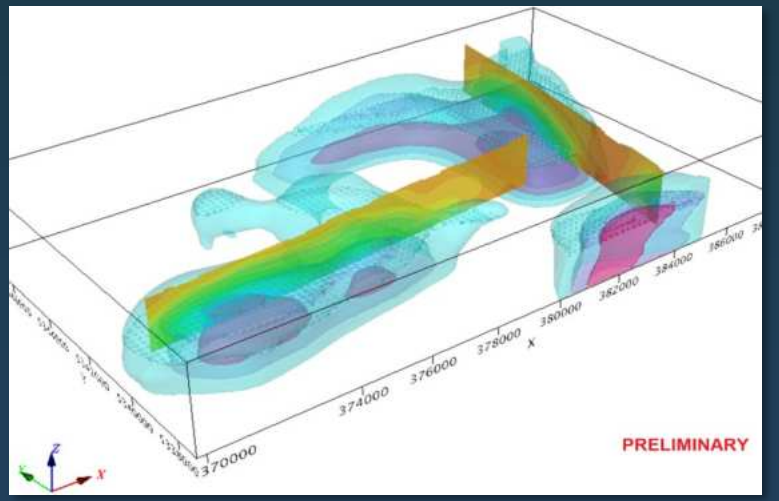


The preliminary gravity data with a terrain-correction applied at a density of 2.67 g/cc.

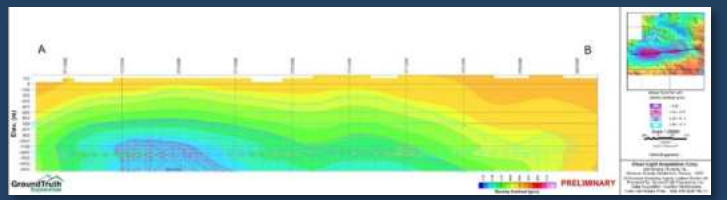
Data Interpretation

The inverted density contrast model is residuals, and according to the convention used by GRAV3D code, a positive density contrast results in a positive gravity anomaly. The reconstructed preliminary density contrast model from the 3D inversion shows that the outline of high gravity anomalies results from dense sources having a density contrast greater than 0.10 (g/cc).

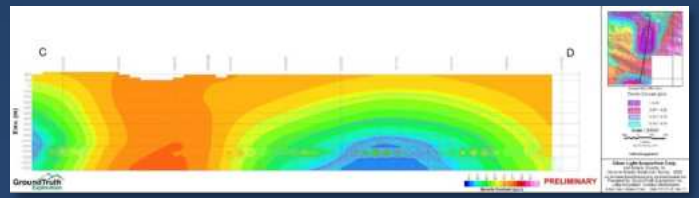
In contrast, the notable gravity features within the Property are caused by less dense material with a density contrast ranging from <-0.20 to -0.05 (g/cc). The vertical cross sections of the preliminary inverted density contrast model along sections AB and CD are shown in Figures 6 and 7. The cross sections delineate three remarkable low-density anomalies (blue) that could be considered perspective targets for further exploration.



The density contrast model at 500m below sea-level. Outline of iso-density surfaces are superimposed on the map.



Vertical cross section of inverted density contrast model along section AB.



Vertical cross section of inverted density contrast model along section CD.

Cavern Design and Planning

FEL – 1 Preliminary Cavern Design, Planning and Costing

Upon confirming the feasibility and selecting the site, the FEL-1 study will outline the subsurface design, timeline, and associated costs.

Objectives:

- Plan the core well drilling program.
- Apply for an exploration permit.
- Develop the initial cavern design and solution mining timeline
- Evaluate solution mining water and brine management options.
- Set up the subsurface construction schedule.
- Estimate subsurface construction costs with -30%/+50% accuracy.

FEL – 2 Detailed Cavern Design, Planning and Costing

This phase encompasses the bulk of subsurface engineering planning, including core well drilling and additional geophysical mapping work.

Objectives:

- Procure and execute core well drilling.
- Perform laboratory testing on the core to determine key rock properties for cavern engineering designs.
- Procure and execute a 3D seismic survey (if necessary).
- Refine the cavern design and solution mining timeline based on new core data.
- Select the preferred solution mining water and brine management option and define engineering requirements.
- Develop the storage cavern well design.
- Analyze various storage cycles and refine storage capacity.
- Conduct geomechanical modeling to define safe cavern storage operating parameters.
- Estimate subsurface construction costs with -20%/+30% accuracy.

FEL – 3 Final Cavern Design, Planning & Costing

This stage refines cavern operations based on techno-economic requirements and finalizes the subsurface design.

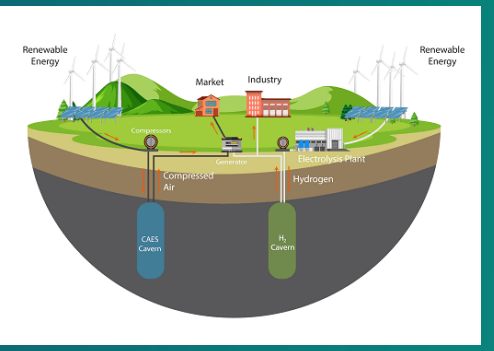
Objectives:

- Finalize the cavern design and solution mining timeline.
- Finalize the solution mining water and brine management system.
- Finalize the cavern well design, completion, and gas first fill parameters.
- Finalize operating storage cycle parameters and envelopes.
- Finalize equipment and requirements for subsurface construction.
- Develop permitting documentation.
- Estimate subsurface construction costs with -15%/+20% accuracy.

Service/Equipment Procurement & Permit Approval

- Contract services and procure equipment necessary to begin subsurface construction based on the finalized design from the FEL-3 phase.
- Submit permits for approval.
- The cost will depend on the required equipment and services.

Begin Cavern Well Drilling & Construction



Source: https://renewablesnow.com/news/corre-siemens-energy-enter-into-global-caes-partnership-839134/

Vortex's Collaboration With the U of A Receives Alberta Innovates & NRCAN Funding

The University of Alberta will receive a total of $1.2 million from the Government of Alberta, through Alberta Innovates, for the project titled "Field Trial of Hydrogen Storage in Canadian Domal and Bedded Salts"

- The project is a joint collaboration between the U of A, Keyera Corporation and Vortex Energy Corp.
- Vortex is actively seeking out other provincial and federal grants available for hydrogen storage in salt caverns
- https://albertainnovates.ca/news/alberta-innovates-and-emissions-reduction-alberta-announce-new-hydrogen-funding/

Vortex Energy Team

PAUL SPARKES

CHIEF EXECUTIVE OFFICER

Paul Sparkes is an accomplished business leader and entrepreneur with over twenty-five years of experience in media, finance, capital markets and Canada's political arena. Paul spent a decade as a leader in the broadcast and media industry as CTV globemedia's Executive Vice President, Corporate Affairs. He also held senior positions in public service, including with the Government of Canada as Director of Operations to Prime Minister, Jean Chretien, and as a senior aide to two Premiers of Newfoundland and Labrador. Paul was a Co-Founder and executive vice chairman at Difference Capital Financial and serves on a number of private and public boards. He is currently President of Otterbury Holdings Inc. and is an advisor and deal maker for growth companies in the private and public markets.

SHAWN RYAN

TECHNICAL ADVISOR

Shawn grew up in Timmins Ontario and began his career in exploration in the early 80's working with Kidd Creek Mine's geophysics team and various other local contracting firms. Shawn moved to the Yukon in 1990 to collect wild mushroom and settle in Dawson City. In 1996 he decided to try his luck as a Prospector. He focused his prospecting in the Dawson District looking for the sources of all the alluvial gold. His research led to perfecting soil sampling techniques that led him to mapping out many new gold discoveries. He has been honored with the Yukon Chamber of Mines Prospector of the Year in 1998 for the Horn, high grade gold skarn discovery in the Tombstone Mountains north of Dawson City, and with RyanWood Exploration in 2009 for initiating what is now called "The Yukon Second Gold Rush". Shawn received the Spud Huestis Award for excellence in prospecting and mineral exploration from AME BC in 2010 for the White Gold Discovery (Kinross). In 2011 Shawn was also honored with the Bill Dennis, Prospector of the Year Award by the PDAC for prospecting success with a Canadian discovery on the White (Kinross) and Coffee (Goldcorp) Projects. During the last 10 years (2012 -2022) Shawn and the GroundTruth Exploration team have been working on developing new exploration techniques (Drones to Drills ™) that have dramatically dropped the exploration cost by roughly 70%, can be worked all year round and is extremely environmentally friendly.

PIOTR KUKIALKA, PH.D, P.GEO

TECHNICAL ADVISOR

Piotr Kukialka, M.Sc, P.Geo, is a salt cavern specialist with broad experience across a variety of world class projects in Canada, the United States, and Europe. With over 20 years in industry, Piotr has provided technical, geological, and engineering support in the solution mining field for all types of salt caverns (storage, waste disposal, and brine production). He has worked for DEEP. Underground Engineering GmbH (Germany), and consulted for Encana / Cenovus, CNRL, CBW Engineering / SubTerra Engineering, and Pure Environmental. Mr. Kukialka is a Ph.D. candidate (2023) in solution mining and salina geology at the AGH University of Science and Technology, Krakow, Poland.

Dr. Jared Suchan, PH.D. P.GEO

VP of Exploration

Dr. Suchan is a professional geoscientist with nearly 10 years of experience in the exploration and development of mining projects in Canada. He received his Ph.D. in Environmental Systems Engineering in 2023 and his Honours B.Sc. in Geography and B.Sc. in Geology in 2016 from the University of Regina. His expertise is in the development and execution of early-stage mineral exploration programs in the remote regions of Canada. His previous experience includes coal mining operations and uranium exploration in Saskatchewan, rare earth element and diamond exploration in the Northwest Territories, and gold exploration in the Yukon. Dr. Suchan currently serves as the Chief Operating Officer for the rare earth element exploration company Northern Critical Minerals Corp., and as a Managing Partner with the mineral exploration project generator company Voyageur Exploration Ltd.

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Developing the Future of Salt Mining, Hydrogen/Energy Storage & CO2 Capture in Atlantic Canada

CSE: VRTX | OTC: VTECF | FRA: AA3
2025 Corporate Presentation

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