



Recommendations:

To 'build back better' in a smart, sustainable way that creates jobs and achieves net-zero emission targets, Geoscience BC recommends that Budget 2022 supports collaborative public earth science by:

1. Providing core program funding of \$5 million per year to Geoscience BC for five years (a total of \$25 million).
2. Expanding the federal government's relationship with Geoscience BC to increase earth science research partnerships in Western Canada.

This will enable proposed Minerals and Energy & Water research such as:

Identifying Critical Minerals and Metals

- Regional geophysics and geochemistry.
- Innovative earth science tools to attract new investment.

Advancing Carbon Capture Utilization and Storage (CCUS)

- Identification and assessment of CCUS targets: broad collaboration addressing needs of multiple sectors (e.g., energy, cement, forestry, mining).
- Industrial applications for carbon sequestration through mineralization.

Catalyzing Clean Energy

- Regional projects advancing geothermal power generation, electrification of industrial sites and hydrogen generation.

Geoscience BC Written Submission to the Pre-Budget Consultations in Advance of the 2022 Budget

“Working collaboratively has been the hallmark of Geoscience BC’s success, and will continue to be so in the coming years.”

Lana Eagle, Reconciliation Specialist and Director, Geoscience BC, AME and PDAC

1. Background & Alignment

Geoscience BC is an independent, not-for-profit society that generates, promotes and supports applied geoscience research relating to minerals, energy and water resources to encourage investment and:

- a. Reduce & Capture Emissions
- b. Catalyze Low- & Zero-emission Energy
- c. Identify New Critical Minerals Deposits
- d. Understand & Protect Water Resources
- e. Build Capacity, Understanding, Partnerships, Indigenous Involvement & Advance Reconciliation
- f. Develop Made-in-Canada Innovations

Geoscience BC: Adding Value Through Collaboration

- ✓ Model proven to encourage investment and create jobs
- ✓ Consortium approach to answering key environmental, social and governance questions (e.g., CCUS)
- ✓ Independent structure builds trust, respect and partnerships
- ✓ Subject matter experts provide project direction and post-project peer review
- ✓ Leveraging core funding multiplies research value and impact
- ✓ Collaborative engagement model generates support and understanding

Established in 2005, Geoscience BC’s effective and efficient model puts 80% of core funding directly into project research and management and 20% to supporting strong governance, community engagement and public research access, adding significant value.¹

Part of a successful and coordinated approach to public geoscience, a key Geoscience BC objective, is to complement the work of the British Columbia Geological Survey (BCGS) and NRCan-Geological Survey of Canada (NRCan-GSC).

“The development of the hydrogen sector in British Columbia will be greatly aided by the work of Geoscience BC on the potential of mineral carbonization, geothermal energy and CCUS to facilitate production of low-carbon intensity hydrogen.”

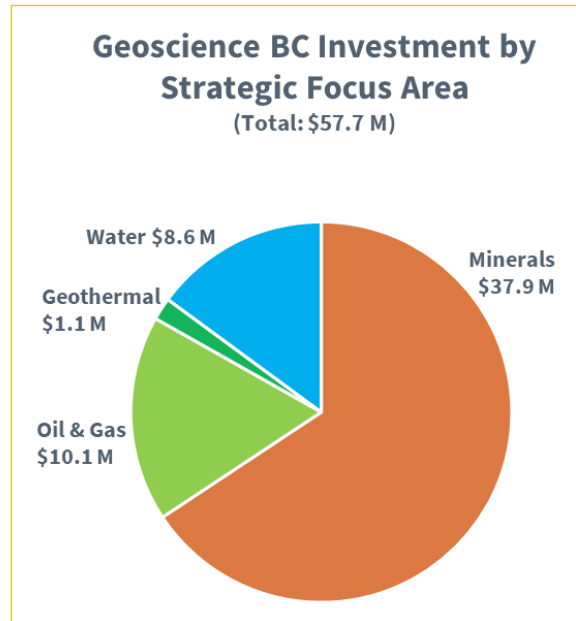
Colin Armstrong, Chair, Hydrogen BC and Mark Kirby, President & CEO, Canadian Hydrogen & Fuel Cell Association

¹ All figures in document to March 31, 2021

Efficient Model that Leverages Core Funding; Adds Value Through Collaboration

By leveraging core funding (\$57.7 M) through attracting partner contributions (\$41.4 M), every \$1 of Geoscience BC's research investment in strategic focus areas since 2005 was multiplied by an average of \$1.72. For 2020/21, this increased to \$2.30. Examples of funding contributors include industry, Western Economic Diversification Canada (WD) and Northern Development Initiative Trust. Indirect support includes use of research sites and laboratories.

Geoscience BC does not pay academic institutions' typical 20-25% overhead fees, allocating more funding directly to research.



Existing Relationship with Federal Government

“Geoscience BC (is) breaking new ground and demonstrating the kind of leadership that will ensure Canada’s place among the world’s technological leaders for years to come.”²

Honourable Jonathan Wilkinson

Geoscience BC seeks to expand its successful relationship with the Government of Canada. Current collaboration examples include:

Carbon Mineralization Potential Research

- Led by the University of British Columbia, includes work to identify and map ultramafic rocks in British Columbia with the potential to react with atmospheric CO₂ to form carbonate minerals, reducing greenhouse gas (GHG) emissions.
- Geoscience BC contributing funding; partners include industry, universities, BCGS and NRCan-GSC.
- Interim report for the Geoscience BC-funded portion of this program was published in 2020: www.geosciencebc.com/projects/2018-038/

GHGMap

- Cost-effective, accurate, real-time detection of GHG concentrations and fluxes using drone-mounted NASA optical laser sensors: www.geosciencebc.com/projects/2016-065/
- Geoscience BC and WD funding.

Garibaldi Geothermal Volcanic Belt Assessment Project

- Geoscience BC and NRCan-GSC co-funding, collaboration with seven universities.
- Identifying geothermal energy potential in Southwest BC.
- Reducing investment risk.
- Geoscience BC support includes industry, community and Indigenous engagement: www.geosciencebc.com/projects/2018-004/



² <https://www.newswire.ca/news-releases/vancouver-clean-technology-sector-receives-a-boost-677020153.html>

Alignment with Federal Priorities

“Geoscience BC's work in finding suitable CO₂ sequestration sites in BC and in Canada is instrumental in the wide deployment of Svante's carbon capture technology and constitutes an important step towards achieving net-zero emission goals.”

Brett Henkel, Co-Founder and Vice President Strategic Accounts and Government Affairs, Svante Inc.

Geoscience BC research aligns with federal priorities, including:

- ✓ Canadian Minerals & Metals Plan; emerging Pan-Canadian Geoscience Strategy.
- ✓ Canada–U.S. Joint Action Plan on Critical Minerals Collaboration; Canada's Critical Minerals List.
- ✓ Hydrogen Strategy for Canada.
- ✓ CCUS.
- ✓ A Healthy Environment and a Healthy Economy / Pan-Canadian Framework on Clean Growth & Climate Change.

- ✓ Science-based decision making; Canada's research ecosystem.
- ✓ Advance meaningful reconciliation with Canada's Indigenous Peoples.
- ✓ Positioning Canada as a global clean technology leader.
- ✓ Advance electrification of Canadian industries; transitioning Indigenous communities from diesel.
- ✓ Innovation and long-term recovery.
- ✓ Decarbonizing the economy; Net-Zero Accelerator Fund.
- ✓ Canada Water Agency.
- ✓ Centre of Innovation and Clean Energy; Pacific Economic Development Canada.



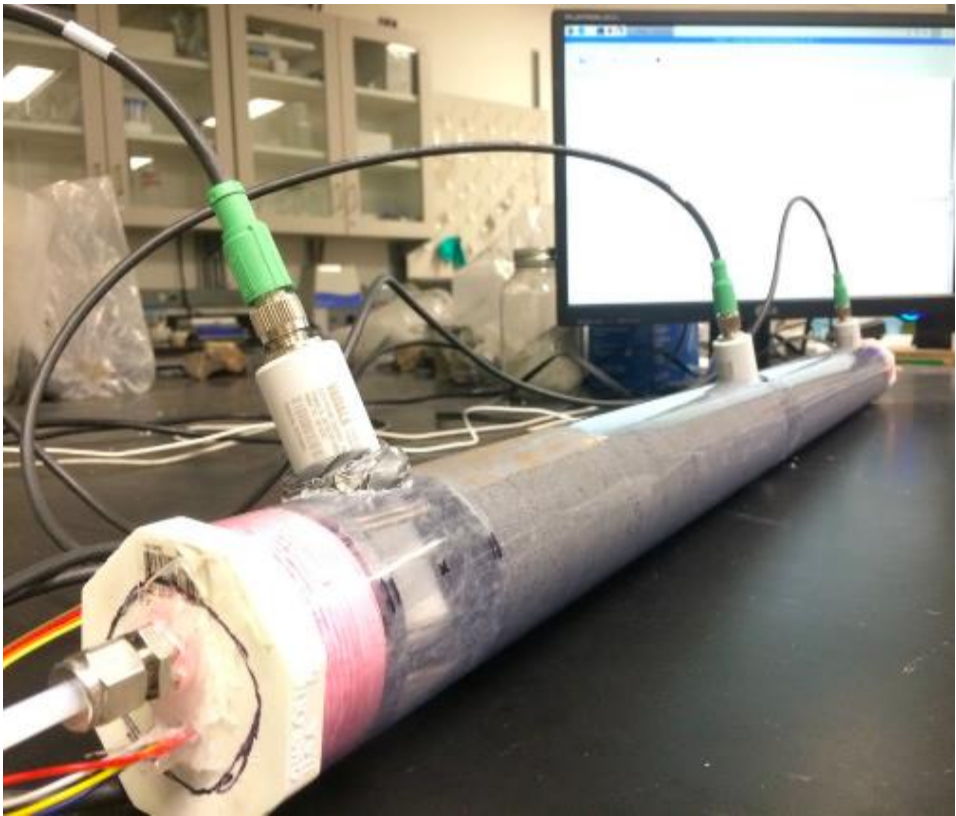
2. Existing Research Examples

a. Reduce & Capture Emissions

“The results will assist in the planning of future carbon capture and storage projects.”

Dr. Gregory Dipple, Bradshaw Research Initiative for Minerals and Mining

Value	Collaborative, consortium approach is efficient; addresses needs of many partners.
Current Project Example: Carbon Mineralization Potential of Ultramafic Rocks	<ul style="list-style-type: none">• Project is part of research consortium including Clean Growth Program.• Ultramafic rocks react with atmospheric CO₂ and form carbonate minerals, reducing GHGs.• Identify, map and index carbon mineralization potential.• Program collaboration includes industry, universities, NRCan-GSC and BCGS.• Future potential for project to be expanded as mines look to meet net-zero targets.



b. Catalyze Low- & Zero-emission Energy

“We are grateful for this unique opportunity to pursue clean, renewable energy that can provide us with food security, energy independence and diverse economic opportunities in our territory... the possibilities are endless!!!”

Chief Sharleen Gale, Fort Nelson First Nation (FNFN)

Value	De-risking geothermal exploration.
Past Project Example: Clarke Lake geothermal technical studies	<ul style="list-style-type: none">• Research led to \$40.5 M federal investment (including Emerging Renewable Power Program) in FNFN geothermal project.
Current Project Example: Garibaldi Geothermal Volcanic Belt Assessment Project	<ul style="list-style-type: none">• Collaboration with NRCan-GSC; 7 universities.• Geothermal energy potential in Southwest BC.• Indigenous input and involvement.• Phase 1 attracted investment from Remedy Energy Services Inc.



c. Identify New Critical Minerals Deposits

“Being involved early in Geoscience BC research...puts the Tahltan Nation at the forefront of research in our territory, especially relating to mineral exploration and development.”

President Chad Norman Day, Tahltan Central Government

Value	Every \$1 spent on research attracts at least \$5 of mineral exploration investment. ³
Current Project Example: Central Interior Copper-Gold Research Program	<ul style="list-style-type: none">• Copper is on Canada’s Critical Minerals List.• New surficial maps and geophysical interpretations; partnership with the NRCan-GSC to reanalyze existing samples.• Reanalysis using modern techniques adds value to historical samples.
Current Project Example: NE BC Lithium – Formation Water Database	<ul style="list-style-type: none">• Lithium is on Canada’s Critical Minerals List.• De-risking lithium exploration and incentivizing extraction by providing initial concentration data set.

³ PDAC analysis shows every \$1 invested in public geoscience results in \$5 of mineral exploration investment (<https://www.pdac.ca/priorities/advocacy/federal-budget/budget-2014/geoscience-investments>). Analysis of Geoscience BC projects shows every \$1 invested results in \$6.60 of investment.

d. Understand & Protect Water Resources

“Water has a spiritual nature to our people...This program is a helpful step because it gathers Traditional Knowledge and explores how it can be considered alongside Western science in decision making.”

Nathan Paul Prince, Traditional Land Use Coordinator, McLeod Lake Indian Band

Value	Geoscience BC research resulted in industry investing >\$50 M in water treatment.
Current Project Example: Saltworks Airbreather Pilot	<ul style="list-style-type: none">• Innovative evaporation system to treat produced water on-site.• Project part-funded by Sustainable Development Technology Canada.
Current Project Example: Assessment of Fugitive Natural Gas on Near-Surface Groundwater Quality	<ul style="list-style-type: none">• Research into effects of controlled natural gas leak into a shallow confined aquifer. Part-funded by NRCan.



e. Build Capacity, Understanding, Partnerships, Indigenous Involvement & Advance Reconciliation

Value	<ul style="list-style-type: none"> Public geoscience research and data increasingly valued by Indigenous groups for economic development and job creation, early-stage involvement in resource development, land planning and environmental protection. Geoscience BC scholars produce valuable research. Many go on to senior leadership positions.
Current Project Example: Traditional Knowledge and Scientific Data Education, Comparison and Collaboration in Northeast BC Surface Water Use	<ul style="list-style-type: none"> Part of Pilot Collaborative Water Monitoring Program to increase understanding of water quality and quantity. Bringing together researchers and Indigenous representatives from the Treaty 8 First Nations in BC's Northeast Region to collect surface water quantity and quality data from Traditional Knowledge perspective.
Past and Current Project Examples: Understanding and predicting induced seismicity	<ul style="list-style-type: none"> Includes industry, provincial government and NRCan partnerships through BC Seismic Research Consortium.



Each year, the [Geoscience BC Scholarship Program](#) supports up to 10 earth science, geoscience or applied geoscience graduate students with research projects in BC.

More than 130 students have been awarded scholarships, boosting the next generation of geoscientists.

f. Develop Made-in-Canada Innovations

“The Digital Technology Supercluster... benefits from the work of Geoscience BC as it brings industry and academic research expertise together to help solve industrial challenges while focusing on building a better BC for all citizens.”

Sue Paish, CEO, Canada’s Digital Technology Supercluster

Value	<ul style="list-style-type: none">• Makes Canada a more competitive, attractive jurisdiction for investment.• Reduces GHG emissions and other environmental impacts.• Works towards provincial and federal recommendations and targets.
Past Project Example: Halogens in Spruce Treetops and Integration with Existing Multi-Element Data	<ul style="list-style-type: none">• Developing and testing innovative mineral exploration tools. Low environmental impact tool used in hard-to-access locations.
Current Project Example: GHGMap	<ul style="list-style-type: none">• Drone-mounted NASA optical laser sensors.• Cost-effective, accurate real-time detection of GHG concentrations and fluxes.• Significant WD funding and support.

