

Quebec Surficial Mineralization Hub

Hub québécois de minéralisation de surface

A Special Opportunity from the Frontier Innovation Program, in partnership with Carbon Removal Canada

Why surficial mineralization?

Surficial mineralization (SM) is a highly promising carbon removal pathway. Alkaline minerals naturally carbonate on millennial timescales, but engineering approaches to accelerating this process is a promising path to carbon drawdown. Frontier views SM as one of the [most promising pathways for gigaton-scale carbon removal](#) due to its potential for ultra-low costs (target <US \$80/ton), scalable feedstocks, safety profile, and use of "closed" systems that are easier to measure and verify. However, the precise technologies that can achieve drawdown at lowest cost are unknown.

This RFP focuses on the development of SM technologies starting with a shared feedstock resource. The **Thetford Mines region in Quebec** contains some of the world's largest resources of serpentinite mine tailings and a wealth of local resources for mining technology development. By starting with legacy mine wastes, technology developers can massively accelerate their early stage engineering and piloting work. Additionally, we can compare the safety and efficacy of different SM approaches. For the Thetford community, this project represents an exciting opportunity to valorize and potentially remediate existing mine waste piles, establishing a new green technology economic engine for the region, reinvigorating the historic mining industry that was once its main economic driver.

Applying for the program

For technical teams piloting new SM technologies or working to solve critical research gaps in SM, Frontier offers funds upfront to accelerate research and development. Under this program, Frontier provides **prepurchases** of future carbon removal tons and **research and development (R&D) grants**.

This project is a unique, geographically-focused instance of the broader [Frontier Innovation Program](#). This RFP is specifically designed to solve key bottlenecks in SM by providing high-potential teams with immediate access to feedstock and infrastructure. Frontier will accept short pre-applications to this RFP through **May 26, 2026**. Full applications will be invited in early June.

You might be a good fit if you...

- **Prepurchases:**
 - Have lab-scale performance and preliminary stability data showing proof of concept.
 - Have a Technoeconomic Analysis (TEA) based on a process flow diagram and mass and energy balance.
 - Have a Measurement, Reporting, Verification (MRV) approach outlined that identifies risks and plans to reduce uncertainty.
 - Have secured the staff to execute your proposed project, and have the ability to spend extensive time on site in Thetford Mines for a majority of the project term.
 - Can deliver first tons within ~1-2 years.
- **R&D grants:**
 - Have a defined research scope and goal that addresses a key gap in scientific knowledge that is necessary to support the development of surficial mineralization systems for carbon removal.
 - Have secured the staff to execute your proposed project, and have the ability to travel and work on site in Thetford Mines for significant periods of the project term.
 - Can achieve results within ~18 months and agree to share your findings transparently with the field through preprints or other accelerated means.

Who is behind this RFP?

- **Carbon Removal Canada (CRC):** CRC is leading the Quebec Surficial Mineralization Hub. CRC will provide day-to-day assistance to grantees and prepurchase suppliers. Further, CRC will be responsible for community engagement, regulatory coordination, and knowledge mobilization.
- **Frontier:** Responsible for project sourcing, technical diligence, selection, and funding.
- **Other Organizations:** The 3R Coalia–Kemitek consortium is a key local partner providing mining technology and scale-up expertise. The project is supported by the **City of Thetford Mines** and **DuGrisAuVert** ecosystem - the regional 2040 strategic redevelopment plan for the MRC des Appalaches.

What's available as part of the hub?

Participants in this program will have access to a mature ecosystem designed to move projects from the lab to the field quickly:

- **Feedstock:** Access to thousands of tons of reserved serpentinite tailings from Thetford Mines. Please see [feedstock details here](#).
- **Contract research services:** Access to services from state-of-the-art contract research labs and pre-commercial facilities at **Coalia** (mineral processing, comminution, and

analytical tools like SEM and XRD) and **Kemitek** (chemistry and scale-up equipment). Participating projects are expected to pay for these services out of their funding.

- **Site Space:** 1 year of free rental space at the 3R Mineral demonstration facility, with further usage fees covered by project funding.
- **Safe Handling & Permits:** Site-readiness, including specialized asbestos handling protocols and established safety controls.
- Mature local ecosystem orchestrated by the **DuGrisAuVert ecosystem**, which serves as a facilitator and the gateway to the region.
- **Management, federal engagement, and knowledge sharing:** Carbon Removal Canada is the administrator of the program, responsible for hub operations, reporting, policy, and community engagement.
- **Liability:** Mine owner maintains all past asbestos liabilities on-site. Grantees are responsible for waste disposal of new materials created by their processes and must adhere to strict safety protocols.

Funding

- Prepurchases for Carbon Removal will be in the range of \$250K - \$1.5M
- R&D Grants will be in the range of \$250K - 750K
- Please see the [Frontier Innovation Program](#) page for more information

What types of projects are we looking for?

Proposals should specifically address one or more of the following key questions that we see as critical to building the case for surficial mineralization with ambient air. We understand that there is likely a tradeoff between cost and time to delivery; for these projects we are open to considering CDR delivery occurring over 10–50 years if that meaningfully improves process economics.

1. “Reactivity”: Approaches for mechanical, chemical, thermal, or other preprocessing of serpentinite rock, including the chrysotile component, in order to
 - a. Increase its passive dissolution and/or carbonation rates.
 - b. Reduce the impact of passivation (i.e. maximize complete feedstock carbonation).
2. “Pile Architecture”: Innovations in the design of the physical structure in which the minerals are in contact with air. The goal is to achieve high CO₂ infiltration of large amounts of feedstock to drive reactivity without large pressure drops or energy requirements.
 - a. Example baseline designs include mineral sorbent air contactors for DAC, structured piles, heap leach pads, and churned layers of materials.
 - b. It’s also possible to propose liquid phase systems in which alkalinity is leached from rock before air contacting.
3. “End-to-end”: Integrated approaches (feedstock preprocessing *and* pile architecture) that achieve ultra-low cost.

4. “Basic science”: step change improvements in methodologies for measuring and modeling reactivity rates that could then be applied to compare materials at other ultramafic sites.

Evaluation Criteria

Frontier evaluates all proposals through four lenses:

1. **Approach:** Does the technology meet Frontier’s criteria for durability, scalability, and net negativity?
2. **Execution:** Can the team deliver on the proposed plan, given their expertise and the resources at Thetford?
3. **Portfolio:** Does the project help Frontier build a diverse, risk-adjusted portfolio of CDR solutions?
4. **Acceleration:** Will this specific funding be catalytic for the supplier and the broader SM field?

Apply here

[Quebec Surficial Mineralization Hub Pre-Application](#)