

Call for Expression of Interest

Advancing the feasibility of direct air capture deployment in Newfoundland and Labrador.

The NetZero Project is looking for researchers interested in collaborating on a NSERC Alliance (Option 2) grant, focused on direct air capture (DAC), one of the province's best opportunities for large-scale negative emissions projects.

This is a unique opportunity to combine Memorial University's research capabilities in a mission-focused effort working alongside the team from the NetZero project with the objective to understand and advance the feasibility of DAC deployment in NL.

Interested researchers can contact the Research Innovation Office at rio@mun.ca to join the conversation and express interest in learning more about this exciting project.

Project Background:

Newfoundland and Labrador (NL) have committed to achieving net zero greenhouse gas emissions by the year 2050, and it is clear, via research and analysis, that NL cannot achieve net zero without negative emissions projects. DAC is a technology-based approach to negative emissions. It typically involves the use of clean energy to power arrays of large fans which draws in air and then separates from its CO₂.

Research is required to understand how DAC, which involves still-emerging technologies and processes, can be deployed in NL. The deployment of DAC will have significant positive economic, social, and environmental outcomes for NL in the form of economic activity and innovation, green jobs, and environmental improvements. The NetZero Project team is looking to collaborate with Memorial University researchers that can contribute to this effort, including expertise in Carbon capture and storage, Wind energy and other clean energy systems, and Electricity systems and optimizations

About the NetZero Project:

The [Net Zero Project](#) is a collaboration between [Energy NL](#), [econext](#), and [OilCo](#) with a mission to provide analysis on technologies that will reduce greenhouse gas emissions (GHGs) in the offshore oil and gas sector, identify economic challenges that may exist, and recommend enabling policies within the context of achieving net zero emissions by 2050 - while growing oil and gas production offshore Newfoundland and Labrador (NL).

About the Research Innovation Office:

Memorial University's [Research Innovation Office](#) (RIO) helps move ideas towards opportunities via industry connection, funding, intellectual property support and programming.

About NSERC Alliance – Option 2 Grants

Alliance grants encourage university researchers to collaborate with partner organizations. These grants support research projects led by strong, complementary, collaborative teams that will generate new knowledge and accelerate the application of research results to create benefits for Canada. Option 2 grants can be 100% funded to encourage research aiming to address a society challenge. The challenge may have longer-term benefits but need current attention. Although you may not be able to achieve your ultimate goals in the scope and timelines of the project, the NSERC contribution will allow you to make crucial advances toward these goals. Read more [here](#).

Information Sheet

Direct Air Capture (DAC) – Potential for Carbon Offsets in Newfoundland and Labrador

Direct air capture (DAC) is a type of carbon capture technology that extracts CO₂ directly from the atmosphere and known as a “carbon negative” technology. Other carbon capture technologies (such as post-combustion carbon capture) can prevent CO₂ from entering the atmosphere, for example when fossil fuels are burned during industrial processes. However, when DAC is used in conjunction with other technologies to further reduce CO₂ in the atmosphere, it can be known as a “carbon offset.” Existing preventative carbon capture technologies cannot remove 100% of CO₂ from industrial emission streams and some CO₂ is released to the atmosphere. Carbon offsets such as DAC, used along with preventative carbon capture technologies, are therefore important to help achieve overall net zero emissions in Newfoundland and Labrador (NL) and the rest of the world.



Figure 1: Banks of fans blow air through a carbon dioxide-capturing solution in this rendering of a direct air capture plant. Source: <https://www.science.org/content/article/cost-plunges-capturing-carbon-dioxide-air>

There are other potential carbon offsets that utilize nature-based solutions to remove CO₂ directly from the atmosphere such as enhanced weathering, ocean fertilization, afforestation, and reforestation. DAC provides the best near-term solution since the technology is more mature and captured CO₂ can be more easily measured and verified. However, due to the low concentration of CO₂ in the atmosphere, current DAC technologies are more energy-intensive and expensive than other carbon capture applications. Deployment of large-scale DAC requires significant land usage (but less than other carbon offset technologies) and water resources are needed for the capture process. Since the province of NL is sparsely populated and has abundant water resources this may not be as challenging as in other jurisdictions.

The prospect of new wind energy developments in NL may present interesting DAC opportunities. When winds are high and electricity is in low demand, DAC systems could be powered by this excess clean electricity. DAC is most effectively used in areas that are windy (increasing the natural airflow through the fans), which makes their use in NL attractive. Once CO₂ is captured, it can be utilized (i.e., in the beverage industry) or preferably, stored below ground permanently in geological formations (reservoirs) so that it does not re-enter the atmosphere. NL offshore has all the geologic requirements needed for safe CO₂ storage as demonstrated by a long history of storing hydrocarbon gas within the reservoirs. After the



Figure 2: Source: <https://www.airbus.com/en/newsroom/press-releases/2022-07-airbus-air-canada-air-france-klm-easyjet-international-airlines>

injected the CO₂ into the subsurface reservoirs, it is important to monitor the CO₂ plume and ensure that it remains in an acceptable area, and at an acceptable pressure, so that it does not compromise the storage complex and subsequently escape.

Currently the regulatory framework required to implement carbon-offset projects in NL is under discussion at the various levels of government including a credit system that may provide economic incentives and thus business opportunities.