

Environmental Remediation with Negative Emissions (MSc only)

The globe faces many environmental challenges including climate change and long term industrial pollution. The legacy of fossil fuel consumption means that most emissions scenarios for the 21st century include negative emissions. The UN scenarios for net zero includes billions of tonnes of negative emissions in the form of BECCS (biomass energy with carbon capture & storage) and biochar, amongst others. The challenge to pure negative emissions from biomass range from land diversion through fugitive emissions, most of which can be mitigated by combining these concepts with phytoremediation.

Phytoremediation refers to growing plants on contaminated soils in order to concentrate the pollutants in the biomass. After harvest, the biomass can be treated to recover the pollutants and produce biochar. The biochar can then be used in a BECCS facility or added as a soil amendment to increase soil carbon. This project is based on remediation of lands polluted through warfare with the objective of removing gunshot residue (Pb, Ba, Zn) and producing a clean biomass solid. The work will then consider the wider implication of these technologies in Canada and how they would integrate into the current energy infrastructure or new infrastructure like a negative emissions pipeline. There are laboratory, GIS and techno-economic aspects to this project.