LANDMARC has received funding from the European Unions' Horizon2020 Grant Agreement No 869367

BECCS

Bio-energy generation using Willow crops from reclaimed open pit mine land in Alberta, Canada

About the initiative

Vast extensions of land have been disturbed by natural resource extraction in Alberta. Increasing environmental regulations and drop in fossil fuel demand has led to the accelerated closing of mines and demand for urgent reclamation and restoration initiatives. On the other hand, the departure of carbon-intensive industries represents new challenges for local communities looking for alternative sources of employment and income. The primary focus on this case study is to evaluate bio-energy generation using Willow crops from reclaimed mine land. Carbon capture, utilization, and storage will be assessed as emission reduction strategies while economic models will be explored as opportunities for local communities in support of a just transition. In close collaboration with stakeholders from various sectors (mining, agricultural, energy supply, transportation, manufacturing, and indigenous communities), this study will use a combination of stakeholder engagement and modeling tools to estimate its emission reduction potential, scalability, as well as socio-economic and policy innovation opportunities. The research activities performed within 2020-2024 are expected to contribute to the development of environmentally responsible economic activities capable of supporting vulnerable communities affected by the energy transition while supporting global sustainable development goals (SDGs).

Focus Area

Within the Canadian Bioenergy with Carbon Capture and Storage (BECCS) project, we will be focusing on the energy conversion, distribution, and use downstream the biomass crop from reclaimed mine land in Alberta (Figure 1). Various biomass processing and transformation technologies will be evaluated based on best market potential, environmental performance, and community preferences. Life-cycle emissions will be estimated along the exploration of business opportunities for local communities. The carbon sink capacity of the biomass (*Salix*) plantation and land management will be considered from project partners and literature data. Climate risks and socioeconomic barriers will be studied as factors affecting feasibility and scalability of such approach. Policy mixes will be evaluated to identify regulatory opportunities to accelerate deployment.

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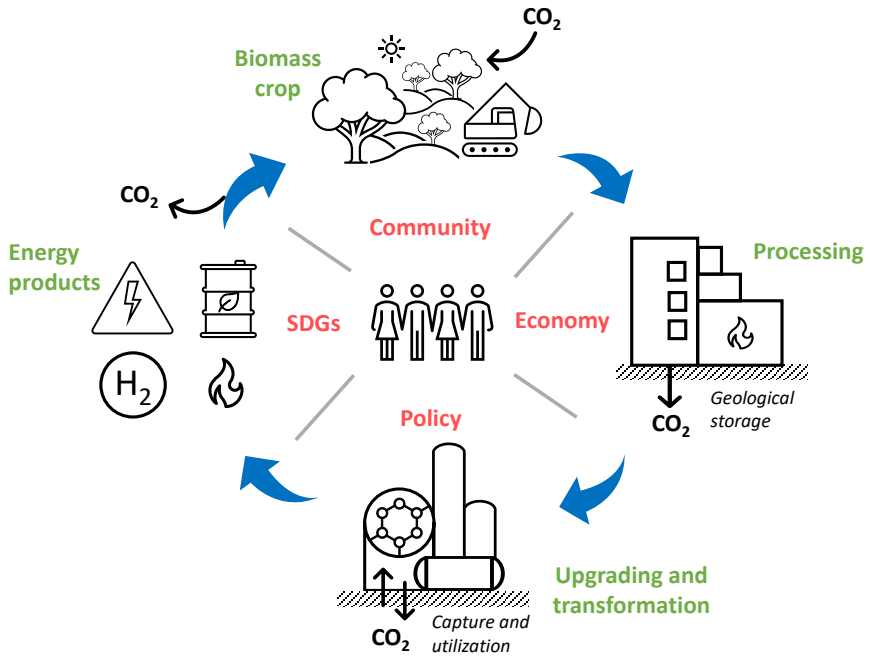

Figure 1. Overview of Canada BECCS project focused on processing, transformation and use of bioenergy crops from reclaimed mine land in Alberta.

What LANDMARC offers

LANDMARC complements the ongoing work on BECCS in Canada through:

1. **Mapping and Modelling:** Deploying various tools such as earth observation (satellite methods) LCA, land-use modeling and socio-economic evaluation technologies and methods that will lead to better assessment of carbon storage, reduction of GHG emission and socio-economic potential of BECCS.
2. **Business:** Understanding stakeholder priorities and business culture in the region. Also, identifying priority areas and multi-sector economic success opportunities (Figure 1). We will also emphasize the potential relevant environmental, social, and economic costs and benefits on carbon emission trading and restoration of critically disturbed land.
3. **Adaptation:** Assessing the impact and vulnerability of land restoration on forest fires, floods, and biodiversity. In addition, potential climate risks will be assessed along with socioeconomic exposure of local communities to further changes in the ecosystem and dominant economic activities.
4. **Scaling:** Since mining activities occur across Canada and many countries, scaleup potential will be pursued by land use and economic simulation models. Trade-offs including biodiversity, land restoration, socio-economic benefits, GHG emissions, will be analyzed.

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