Final Report

Catching Carbon - Transforming Ontario's Underutilized Biomass

Woodleigh Farms Ltd. (Woodleigh) through is division "Catching Carbon" has undertaken a project to design, engineer and construct a pyrolysis plant on their home farm to explore the transformation of underutilized forest biomass to biochar and pyroligneous acid and to determine their effectiveness as a sustainable solution to increase soil health, support crop production and reduce CO2 emissions. The plant has been designed to utilize approximately 2000 tonnes of biomass per annum. The unit will process unmarketable and unmerchantable woody biomass collected from Woodleigh Farms Forest Biomass Recovery Program in conjunction with partnership with the Ontario Woodlot Association (OWA).

Woodleigh has engaged research groups who are interested in evaluating biochar's utilization for enhancing soil and crop production in a temperate climate, with a specific focus on the agricultural sector.

This model overall will create a new market for underutilized forest biomass and other biomass waste that can be demonstrated at medium scale to be a cost-effective solution for both the forestry and agricultural industries.

Contributing and Research Partners on this project include the Centre for Research & Innovation in the Bio-Economy (CRIBE), Ontario Woodlot Association, Ontario Soil and Crop Improvement Association (OSCIA), Agri-Food and Agriculture Canada (AAFC), Ontario Ministry of Agriculture, Food and Agribusiness, University of Guelph, University of Waterloo, Trent University, National Research Council of Canada, Township of Cavan-Monaghan, and Green Economy Canada. It is important to mention that our primary design, build and installation partner ABRI-Tech Inc. was instrumental in assisting to realize the vision of transforming underutilized forest biomass to a value-add product through this project. Their expertise and time dedication to the project was instrumental in its overall success.

Woodleigh's desired outputs and goals that have been developed into the design of the pyrolysis plant include the ability to create biochar at a 20%-25% yield from parent material and to create biochar at a minimum state of 80% - 85% carbon content. The technologies were designed to work at an on-farm level and the plant can operate as a continuous flow operation, capable of

sustaining itself for long periods of time with minimal supervision. Additionally, the project will see the transformation of some of the parent materials (syngas) to create pyroligneous acid (wood vinegar) and heat to be used for drying parent materials.

Key challenges of this project were primarily regulatory in nature. Insurance was extremely difficult to secure as a first-in-kind design. As this project uses novel processes and technologies that fall outside the scope of existing environmental regulations and permitting frameworks, special attention was required. The absence of prior case studies and data lead to longer review times as agencies evaluate potential risks, requested supplemental information, or coordinated across multiple departments. This created delays in commissioning and testing and increased compliance costs for the project. It cannot be stressed enough that it is important to set realistic timelines on working with regulatory bodies and seeking the approvals as early as possible in the project process. Overall, these challenges were overcome with the support of all the partners involved as well as perseverance from Woodleigh's management team.

A primary objective of this of this project is demonstrative in nature. Through its various partnerships Woodleigh seeks to not only validate biochar's role in improving agricultural soils but also to transfer knowledge from the project to support future developments of similar models across the province. Commercialization of the bio-products are targeted as necessary at supporting the growth of the technologies and creating demand for the bio-products produced.

Funding provided for this project from CRIBE was essential to de-risking this innovation. Developing new technologies or processes often involves significant uncertainty, upfront costs, and long timelines before commercial viability is proven. Early-stage innovations, like transforming underutilized biomass into valuable bio-products, face technical, regulatory, and market risks that can deter private investment. Funding assisted Woodleigh to offset these risks by supporting research, prototyping, and demonstration phases, allowing it to validate concepts, refine systems, and attract further investment. By sharing the risk, CRIBE funding enabled the advancement of this novel solutions that might otherwise remain undeveloped due to financial barriers.

Woodleigh looks forward to continuing their journey in this space and to demonstrate the potential of this project so that others may adopt these technologies and further enhance the use and transformation of forest biomass in Ontario to meaningful projects that further support economic and social benefits whilst growing the forestry sector at large.

Norm Lamothe, Woodleigh Farms Ltd.

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Date