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Canadian Wood Fibre Centre

Increasing community economic stability while mitigating climate change impacts

Short-rotation woody crop (SRWC) systems offer solutions for using land suitable for forestry by helping to develop and supply biomass for energy production purposes, while in the process creating economic stability and offsetting harmful greenhouse gases (GHGs) in rural communities.

Need

As Canada's resource economy transforms, forest biomass is becoming a potential fibre supply to bioenergy and biofuel industries. Growth rates, production cost and fibre quality are important factors in such a supply. Across Canada, there are in excess of 60 million hectares (ha) of non-forested land suitable for the growing of fast-growing tree species for a biomass supply. This availability provides new opportunities to rural Canada, where communities depend on resources from agricultural and forested lands for economic stability. Of equal importance to such communities are the impacts of climate change and the quality of air and water. SRWC plantations offer a biomass feedstock that is close to end users, while also providing a range of environmental solutions that include carbon capture, GHG offsets and water and air quality improvement.

Approach

The Canadian Wood Fibre Centre (CWFC) has established a national network of sites across a range of growing conditions to develop and apply SRWC systems. Diverse species and clones – including hybrid poplar, aspen and willow – are planted and tended, and their growth performance is evaluated. Wood fibre is characterized in relation to biomass feedstock requirements. Growth trajectories are forecast and validated based on regular monitoring of plantations.

The network is managed and monitored through collaboration among forest companies, provincial governments, universities and private landowners. In addition to technology development and transfer, the network researches carbon budget monitoring, soil fertility, water use and ecological response.

The network of sites provides knowledge that landowners and land managers can use to evaluate the impact of SRWC systems on the full supply chain. They also use the information to make decisions about site selection, operational regimes and about options and values for the end product.

Decision-support tools include a simulation model to assess biomass case scenarios, best practices guides, national site suitability and yield classification systems. Technology development is accompanied by demonstrations and workshops at the network of sites.

Benefits

SRWCs can be integrated into existing supply streams for industry, with exceptionally high yields of 7 to 11 oven-dry tonnes per hectare per year (t/ha/yr). Environmentally, these plantations are capable of creating GHG offsets of 14 to 20 tonnes of carbon dioxide equivalent per hectare per year (tCO^2e/ha/yr).

External partners have invested $3.0 million (a funding leverage ratio of 4.29) in the network to help address particular needs. In addition, partners in Manitoba are investing $1 million per year over five years for implementing an operational program in central Manitoba. British Columbia has requested an assessment of SRWC options for central British Columbia to address shortages in woody biomass. And Alberta-Pacific Forest Industries Inc. (Al-Pac) has an operational program that involves 1200 ha annually that uses the results of this research to guide its management.

"Research conducted by the Canadian Wood Fibre Centre has provided Alberta-Pacific Forest Industries Inc. with the opportunity to see first-hand some of the current options, and future possibilities, for SRWCs in our region. Al-Pac's operational Poplar Farm Program has benefited from CWFC's interest in SRWC and their demonstration of alternative best practices for plantation design, site preparation and maintenance. The Biobaler project has provided valuable data that Al-Pac will use when developing a long-term biomass supply plan to meet increasing feedstock requirements resulting from increased power production and other projects currently under consideration. Overall, CWFC's research to develop and demonstrate new technologies and possibilities for SRWCs has resulted in tangible benefits to our company."

Randy McNamara
Director – Chip and Biomass Procurement
Alberta-Pacific Forest Industries Inc.

Thus far, research in purpose-grown fibre has reduced transportation costs 70 percent, identified 10.9 million ha of applicable agriculture land within 50 kilometres of a mill site, and increased fibre yield five to eight times that of the native tree species equivalent. Ongoing research and development aims to further refine practices and regimes to reduce the establishment and recovery costs of plantations by 20 to 25 percent. More robust decision-support tools are being designed to better integrate systems into existing and emerging product streams. And carbon and biomass production models are being built to help industry better understand how to enhance economic and environmental values in the supply chain analyses.

Competition and challenges

With shifting biomass demands for energy and traditional forest products in fast-changing markets, SRWC systems offer an alternative to the use of roundwood and residues from forestry and agriculture. The network of sites provides data and decision-support tools to determine where short-rotation systems are economically attractive. A selling point for the systems is their contribution in carbon capture and GHG offsets. A drawback is the cost of establishing plantations. Through the work on the network of sites, refined methods and technologies are helping to reduce costs. More importantly, the network serves as a demonstration to prospective investors. Entrepreneurs have an important role to play in assuming the risk of up-front biomass plantation costs. The network's results will enable better predictions of rates of return for investors.

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