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The Potential of Nanocrystalline Cellulose

Nanocrystalline cellulose (NCC) has the potential to position Canada at the forefront of the emerging bio-economy and transform Canada's forest sector.

What is NCC?



NCC is an abundant, non-toxic, and renewable material derived from the cell wall of trees and plants.

It has enhanced permeability, optical, and strength properties that can support various industrial sectors ranging from the medical to the aerospace sectors. These properties can improve the surface protection of paint and varnishes,

Extracted NCC. Photo courtesy of FPInnovations

as well as enhance a variety of materials such as paper, fabrics, and commercial glues. NCC can also be used in the manufacture of lightweight components for automobiles and airplanes, leading to much lighter, more durable and greener products for the marketplace.



Potential uses of NCC

Big economic potential

FPInnovations, Canada's national forest research institute, estimates that the market potential of NCC in North America alone could be worth more than \$1 billion annually.

Given its potential to generate significant economic benefits and help transform Canada's forest sector, the federal government has invested \$16.3 million since 2007 on NCC research, development, and testing. This research has been led by FPInnovations.

The funding, provided through Natural Resources Canada's Transformative Technologies Program, enabled FPInnovations to develop a method to economically extract NCC from wood biomass. Following its extraction, NCC can be processed into solid flake, liquid, or gel form, thus allowing it to be used in various forest bio-products.

The government also provided another \$23.2 million in funding, through the Pilot Scale Demonstration Program and the Pulp and Paper Green Transformation Program, to build the world's first pilot scale plant for NCC and move this advanced material further along the path to commercialization. This project was supported by an additional \$10.2 million contribution from the Quebec government.

The pilot plant, located at the Domtar pulp and paper mill in Windsor, Quebec, is a joint venture between Domtar and FPInnnovations called CelluForce. The plant, which began operations in January 2012, has since successfully demonstrated its capacity to produce NCC on a continuous basis, thus enabling a sufficient inventory of NCC to be collected for product development and testing. Operations at the pilot plant are temporarily on hold while CelluForce evaluates the potential markets for various NCC applications with its stockpiled material.

The Road Ahead

The future large-scale commercial production of nanocrystalline cellulose can create many high-paying jobs in various industrial sectors across Canada and help position Canada at the forefront of the emerging bio-economy.

NCC also serves as a concrete example of how Canada's forest sector is successfully repositioning itself for a more prosperous future.

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