



The Future of Fibre

September 19/2019





FPInnovations is a not-for-profit private organization that specializes in the creation of solutions in support of the Canadian forest sector's global competitiveness.



Key role

- Competitiveness of the forest industry
- Transformation and diversification of the forest sector



Delivering value & impact

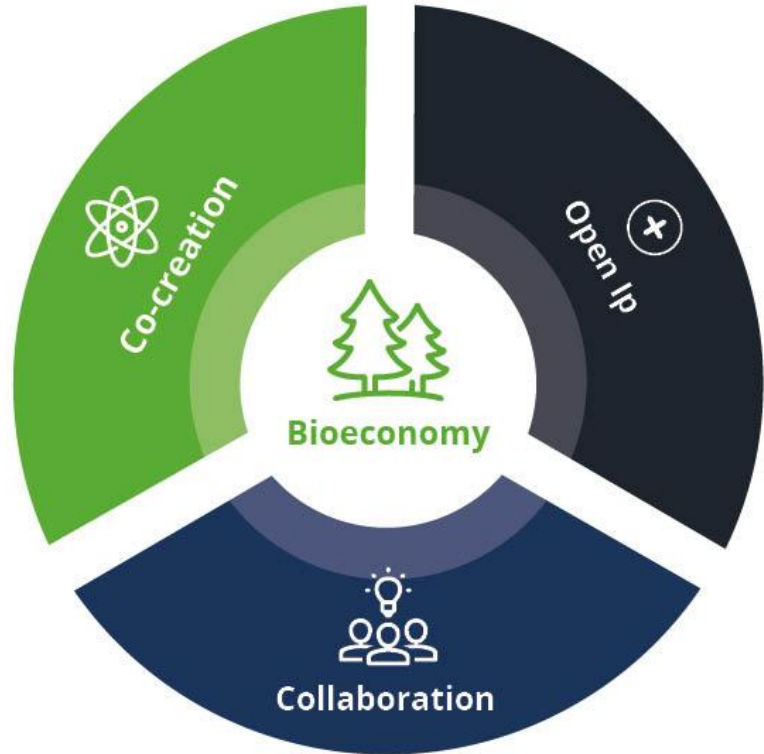
- Supporting the industry's development
- Creating collaboration to increase market growth
- Major scaling-up projects

fpinnovations.ca

INNOVATION AT FPINNOVATIONS

PUT INTO PRATICE...

Initiatives designed to accelerate innovation with other industry sectors, research providers and companies to speed up the use of fiber and other lignin material in new markets



History of BC Fibres

- Strong focus on conventional, commodity products
- Heavy **P** in the SPF mix
- Wood products destined for structural building
- Pulp products destined for printing/writing paper, containerboard, tissue/towel

Figure 4: Where do logs in the Interior end up?⁶

	B.C. Interior		
	Number of Mills	Est. Volume Used (000m ³)	Percent
Lumber Mills	81	40,065	82.4%
Veneer/Oriented Strand Board (OSB) Mills	12	4,625	9.5%
Pulp Mill Wood Rooms	2	139	0.3%
Chip Mills	11	2,355	4.8%
Shake and Shingle Mills	5	36	0.1%
Other Mills	35	363	0.7%
Log Exports	n/a	1,014	2.1%
TOTAL	146	48,597	100%

Future of BC Fibres

Composites-Systems-Fuels-Chemicals

	Conventional Bio-products	Advanced Bio-products
Paper Mills	→ Packaging, Newsprint, Publishing, Substrate, tissue	Composites & Textiles: Cellulose nanocrystals, Cellulose filaments, Micro-fibrillated cellulose, Composites using cellulose fibres, Bioplastics  Advanced Bio-materials
Chemical Pulp Mills	→ Market kraft pulp Tall oil, Turpentine, Dissolving pulp	Chemicals & Additives: Methanol, Ethanol, Acetate, Lignin, Lubricates, Surfactants and rheology, Pharmaceuticals  Bio-chemicals
Mechanical Pulp Mills	→ Market high-yield pulp	Liquid Fuels: Pyrolysis oil, Bio crude, Gas, Bio diesel aviation fuel, Dimethyl ether, Natural Gas (Nexterra Syn-Gas, Gas Technology Institute)  Biofuel
Forests and Process Residues	→ Pellets, Boilers	Solid Biomass: Bio-energy intermediates, Torrefied pellets, Bio-coal, Heat and Power  Bioenergy
Plywood Engineered Wood Products Oriented strand board Mills	→ Panels	Next-gen Engineered Wood: Cross-laminated timber (CLT), Multi-attribute panels, Wood fibre insulation, Hybrid/ tall building solutions, etc.  Conventional Bio-product System with Innovative Technology
Sawmills	→ Lumber	
Harvesting	→ Log	

Drivers for this change:

- Supply side → Non-sawlog quality fibre in BC driving a change in end-product
- Demand side → Global demand for bio-based products, petroleum substitution, light weighting, CO2, health...



Figure 5: Spectrum of bio-product opportunities

Future of BC Fibres – Supply Side



Future of BC Fibres – Supply Side

Tools to Support Fibre Movement

Developing a competency around harvest residuals handling



Resource Assessment

Collection

Delivery

Future of BC Fibres – Demand Side

Commercial Wood-based Composite Examples

Key benefits of Fibrex® material:

- Excellent insulator, preventing heat or cold transfer into or out of your home.
- Resistant to changes in temperature – it doesn't expand and contract unlike vinyl.
- Contains more than 40% reclaimed wood fiber, reducing impact on the environment.

ENGINEERED WITH			
FIBREX®		Andersen EXCLUSIVE	
Material Benefits	Fibrex®	Vinyl	Wood
Insulating Properties	✓	✓	✓
Low Maintenance	✓	✓	
Resistance to Decay/	✓	✓	
Structural Rigidity	✓		✓
Durable	✓		✓
Color/Finish Choices	✓		✓
Maximum Glass Area	✓		varies

Andersen's **Exclusive**
Composite Material Has It All! ✓

Wood Wool Cement Board

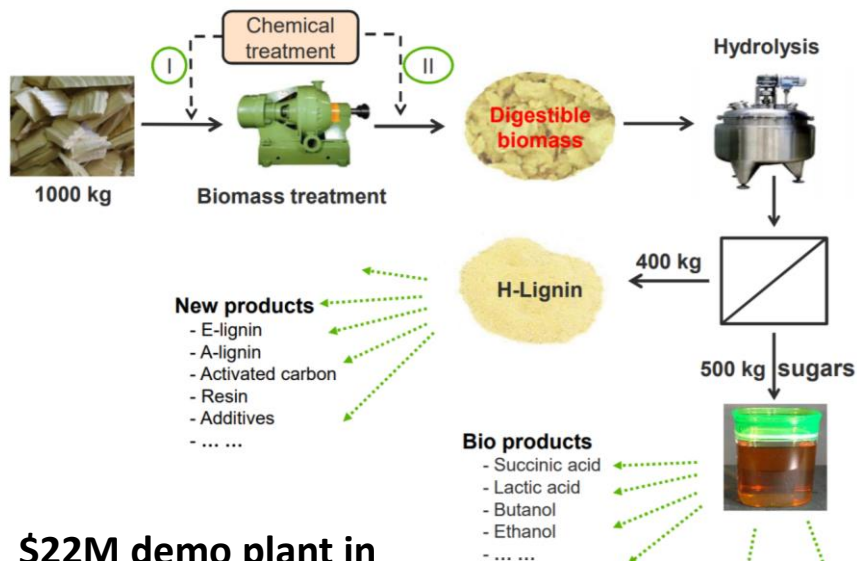
- Uses 30 cm rounds >25 cm in diameter.
- Fire/mold/moisture resistant
- Plant costs ~\$10 million



Future of BC Fibres – Demand Side

Chemicals & Fuels Examples

TMP-Bio Process

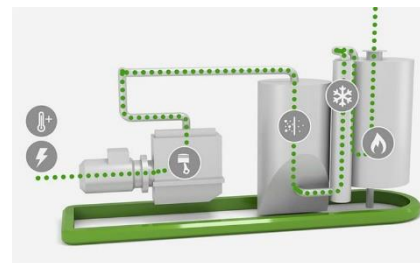


**\$22M demo plant in
Thunder Bay**



**FCR30 (Fossil Coal
Replacement 30 gigajoule)**

Small-Scale CHP



**Volter gasifier → 50kWe + heat*

Future of BC Fibres – *Interaction of BC Fibres with other Materials*

Skills & Technical Education

- Strong knowledge of and experience in composite mechanics theory and micromechanical modelling of composites made with both natural and synthetic fibers.
- Completed doctoral-level courses in both forestry and composites including studying the structure-property relationships in wood-based composites and other natural materials.
- Ph.D. focused on developing constitutive models to predict the stress relaxation behavior of composites and conducting experimental validation and finite-element verification of the developed models.
- Extensive experience in the additional considerations required when manufacturing natural fiber composites such as moisture content and misorientation, and its impact on the mechanical properties of the resulting material.

Job Description

FPIInnovations is currently working on a major packaging project to develop sustainable packaging materials/products (mainly flexible packaging) from the pulp & paper and forest bio-based material industries. ...developing a strategic plan for product development including product performance targets, competitors, major trends and a description of the value chain, creating pathways for light-weighting, sustainability, and high performance attributes.

Future of BC Fibres – Summary

- **Shift from Structural to non-structural fibres**
- **Key will be the interaction of fibres with other materials**
- **Demand opportunity for natural fibres never better**

Thank you

