



OUR NAME IS INNOVATION

# Annual Report \_\_\_\_\_ and Review of Activities

2012–2013

# TABLE OF CONTENTS

2012–2013 in the News	1
Message from the Chairman of the Board and President and Chief Executive Officer	2
Message from the Chief Financial Officer	6
Financial Results	10
Message from the Executive Vice President	12
Our Programs at a Glance and Review of Activities	15
Human Resources	18
Markets and Market Access	22
Transportation	26
Competitiveness and Cost Reduction	29
Transformative Technologies	34
Environment	38
Sustainability of the Fibre Supply	43
Bioproducts	47
Bioenergy and Biomass	51
Collaboration	55
Our Members and Partners	60
Our Governance	65
Our Advisory Committees	66

# 2012–2013 in THE NEWS

## **FPIINNOVATIONS CELEBRATES FIVE YEARS!**

FPIInnovations was founded on **April 1**, 2007 to create one of the world's largest private, not-for-profit forest research centres. Five years later, we are proud of what we have accomplished and keep focusing on our goal: leadership, through innovation.

## **CUTTING-EDGE EXPERTISE WITH CNTA**

The CNTA (Centre national du transport avancé) and FPIInnovations signed in **June** 2012 a strategic partnership agreement aimed at providing a full range of research, engineering and training services with respect to electric and hybrid vehicles in sustainable ground transportation.

## **FIRST NATIONS FUNDING**

The provincial government of British Columbia announced in **September** 2012 that it would provide the First Nations forestry businesses throughout BC an additional \$400,000 funding to allow them to continue to receive the technical support they need to succeed.

## **MOU TO PROTECT WETLANDS**

Ducks Unlimited Canada and FPIInnovations committed in **November** 2012 to working together to support and promote best practices in order to minimize the impact of resource development on habitat in the working boreal forest.

## **COLLABORATIVE RESEARCH WITH CANMETENERGY**

In **February** 2013, FPIInnovations and CanmetENERGY formalized long-standing relationships with the signing of a memorandum of understanding for collaborative research in the bioeconomy sector to identify and commercialize novel products and technologies to help transform the forest sector.

## **CLT HANDBOOK, U.S. EDITION**

FPIInnovations in collaboration with Canadian and American partners launched in **February** 2013 a guide to cross-laminated timber applications in the United States, encouraging adoption and selection of wood-based solutions in residential and non-residential construction.

## **PARTNERSHIP FOR THE PRODUCTION OF BIOCHAR**

FPIInnovations and CTRI (Centre technologique des résidus industriels) announced in **March** 2013 a three-year partnership for the production of biochar from forest biomass as a renewable energy source or higher added-value carbonaceous product.

Message from the

**CHAIRMAN OF THE BOARD and  
PRESIDENT AND CHIEF EXECUTIVE OFFICER**



**Al Ward**  
Chairman of the Board

**Pierre Lapointe**  
President and Chief Executive Officer

**INNOVATION**  
is our  
**GOAL...**

**THIS IS AN INCREDIBLY EXCITING TIME FOR THE FOREST INDUSTRY, AS WE ARE CURRENTLY WITNESSING THE BIRTH OF THE FOREST OF TOMORROW, WHERE CONVERSATIONS ABOUT WOOD, PULP, PAPER AND FORESTS INCLUDE DISCUSSIONS ABOUT GENOMICS, DRONES, INTELLIGENT TRANSPORTATION SYSTEMS, BIOFUELS, INTELLIGENT PAPERS AND NANOTECHNOLOGY.**

Here at FPIInnovations, we are excited to talk about the future and what our role will be in this new era. Once seen as a sunset industry, we have innovated our way to becoming a sunrise industry with tremendous growth potential and capacity to transform. It is no secret that the forest sector has had a very difficult decade, mainly due to rising cost pressures and the global economic slowdown. Rationalization and cost-cutting have enabled us to survive, but simply reducing costs is no longer enough. To flourish, the forest sector has to become a leader in transforming the Canadian economy by rejuvenating a traditional resource-based industry. For the industry to prosper even more, innovation needs to occur on two fronts: through the development of new products and markets, and through novel ways of doing what we do, using the innovative know-how of FPIInnovations.

FPIInnovations' commitment to its members prompts innovative solutions based on the unique attributes of Canada's forest resources. The challenging environment that we have been facing for years has fostered our creativity and forced us to look beyond our traditional products and toward the development of new markets. Our challenge now is to find the equilibrium between enhancing our traditional products and developing breakthrough technologies and products of which there were many this year. FPIInnovations continues to convert R&D knowledge into innovative and marketable solutions, and our collaborations and partnerships built among industries, governments, universities and research institutes have proven that our ideas could easily be applied to other sectors.

Partnerships can lead to new areas of development. Genomics is a case in point. Our partnership with Genome Canada, Genome Québec and Genome BC is now working toward investigating the economic potential of selecting superior trees and using genomics to boost production volume across the industry, which could add \$300 million annually to the Canadian economy. Furthermore, better wood quality could give rise to a 15% increase in average product value at a regular mill.

Our industry was once described as a dinosaur that would be pushed to extinction by more modern industries. That is no longer the case. In fact, drones are on their way to our forests. Air-based inventories will change the way we look at the forest. It will be a major revolution in how we see the forest of the future, because we will now be able to measure volume, basal area, biomass, tree heights and the number of stems per hectare, and eventually identify tree species as well.



The future of Canada's forest industry is already unfolding as we begin to tap the country's forests for new bioproducts. The drive for a sustainable future and a shrinking environmental footprint has inspired FPInnovations' research in biorefinery and transportation, which we expect to make a huge difference in the competitiveness and sustainability of the Canadian forest industry and the economy as a whole. The drive for a sustainable future is expected to lead to more reliance on biofuels derived from what we used to call wood waste. Our research in these fields is of particular interest, given the fact that the price of oil—a non-renewable energy source—remains volatile on world markets.

Bioenergy is part of the platform that is producing new revenue streams for pulp mills, while the future for as-yet-untapped uses of cellulose are truly exciting. There is a whole range of new products where we are just scratching the surface, and FPInnovations' scientists, engineers and researchers are working to improve forest industry performance by identifying avenues leading to new sources of energy and new biochemical products, with a view to finding substitutes for petroleum derivatives.

Nevertheless, the future forest industry will not rely solely on energy as a source of additional revenue; it will make better and higher-valued use of the forest resource. FPInnovations is doing exactly that by encouraging greater use of wood as the building product of choice, and by leading the way in the development of innovative applications and products based on next-generation pulps, papers and bioproducts. Cellulose filaments—a wood fibre-based material whose innovative extraction process was recently discovered by FPInnovations—will revolutionize the production of paper products and will be used as a reinforcing agent in many applications, from hygiene products to biocomposites and bioplastics. Our mills are now in the enviable position of manufacturing novel products within a market that is expected to grow far into the future. The pulp and paper industry is in an extremely advantageous position, as all the infrastructure is in place.

**We're on the cusp of change and the only way forward for the Canadian forest products industry is through innovation. Fortunately, innovation is our name...**

All in all, as you can see, we are extremely excited about everything that is happening and we look forward to a future of opportunities for our members, personnel and partners. On behalf of the management team and the Board of Directors, we want to thank our members, employees and the

people who have worked with us, for their invaluable support over the past year. We would like to express our gratitude for the trust they continue to place in FPIInnovations and in our approach, which is in line with the Forest Products Association of Canada’s Vision 2020: that the Canadian forest products industry will power Canada’s new economy by being green, innovative and open to the world.

We’re on the cusp of change and the only way forward for the Canadian forest products industry is through innovation. Fortunately, innovation is our name...



## Pierre Lapointe

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President and Chief Executive Officer

## Al Ward

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Chairman of the Board



Message from the  
**CHIEF FINANCIAL OFFICER**



**Yves Nadon**  
Chief Financial Officer

**RESEARCH**  
is our  
**TOOL!**



## THE 2012–2013 FISCAL YEAR WILL GO DOWN IN FPINNOVATIONS HISTORY AS ONE WHERE WE CONFIRMED OUR ABILITY TO CREATE TRUE SYNERGIES IN MANAGING OUR REVENUE AND EXPENDITURES.

Efforts to pare down our budget and seek out new market opportunities contributed toward ensuring our organization's long-term viability. The overall context of the Canadian forest industry, shifting towards a healthy recovery, is certainly no stranger to this success. In recent months, the economic performance of several forest industry sectors was stable or slightly improved, particularly in the wood product processing industry, where prices increased in the latter part of the year. Buoyed by the renewed vitality of its members, FPinnovations was able to anticipate and take advantage of market movements and needs. This foresight gave us the resources to continue as a globally recognized leader in forest sector research and make our mark as an innovation specialist.

Three key objectives guided our efforts this year: secure long-term government agreements, create new sources of revenue and pay particular attention to cost control and overhead.

The Canadian government's great emphasis on a strong and vibrant forest industry once again gave rise to a major investment in research, development and technology transfer activities at FPinnovations. Attentive to signs that the industrial sector is gradually recovering, FPinnovations nevertheless expects the proportion of revenue from the federal government to decline over the years, while the private sector and the provinces play a greater role in this regard. It is worth noting that the provinces provided ongoing financial support in the past year, despite major internal political matters such as changes in government.

During the year, FPinnovations continued implementing its new business model—a hybrid model largely based on collaborative research, but now opening up to private research as well. The latter is conducted through strategic alliances with industrial partners having specific competitive needs. Included for the past two years in FPinnovations' business strategy, research for the private sector brought in \$2.6 million in 2012–2013.

**The overall context of the Canadian forest industry, shifting towards a healthy recovery, is certainly no stranger to this success. In recent months, the economic performance of several forest industry sectors was stable or slightly improved, particularly in the wood product processing industry, where prices increased in the latter part of the year. Buoyed by the renewed vitality of its members, FPinnovations was able to anticipate and take advantage of market movements and needs.**

The collaborative research component is still central to FPIInnovations' activities. It is perfectly suited to the traditional forest sector inclined to invest in the development of pre-competitive solutions. This model makes it possible to share not only benefits, but also R&D costs and risks. Financed by industry members (37%), the federal government (45%) and the provinces (18%), collaborative research this year accounted for \$72 million, or 80% of total research revenue. Despite the fact that the number of industry members remained stable this year, the arrival of businesses holding greater market shares contributed toward increasing this portion of total revenue by \$6.0 million.

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In terms of delivery, FPIInnovations is proud to have offered \$10.3 million in products and services to its members and clients this year including the development of many innovative technologies. Revenue from royalties on various technology licences represented \$0.9 million this year, hitting a higher target than the \$0.6 million budgeted.

Determined to use the best practices for managing revenue and expenditures, FPIInnovations remained on the lookout for potential synergies created by pooling resources and complementary expertise. With that in mind, the sale of the building at 580 Saint-Jean Blvd., in Pointe-Claire, QC and the consolidation of activities in the adjacent building at 570 Saint-Jean Blvd. are in line with this approach and are helping to build a financially sound organization that takes the necessary steps to ensure its long-term viability.

A structural reorganization also became necessary during the year to improve the quality of services offered to our members and also to refocus our technical and scientific expertise on the needs of current and future markets.

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Once again this year, FPIInnovations maintained its financial commitment in CelluForce Inc., the strategic alliance forged equally with Domtar that materialized in January 2012 with the inauguration of the pilot plant. CelluForce Inc. is a pioneer in the development of innovative technology: cellulose nanocrystals (CNC), produced on an industrial scale, for rapidly expanding markets. Given the success of CNC and the additional expense to be incurred in embarking on the next phase

of production operations, new strategic partnerships that can open up new markets are foreseeable.

FPIInnovations will continue to optimize its strategy for managing revenue and expenditures. In addition, we will improve the quality of technical and scientific services, and also consolidate relations with the forest industry and its government and academic partners here and elsewhere. The success and vitality of the past fiscal year are harbingers of a future where the Canadian forest industry will pave the way for a true culture of national, productive and sustainable innovation.



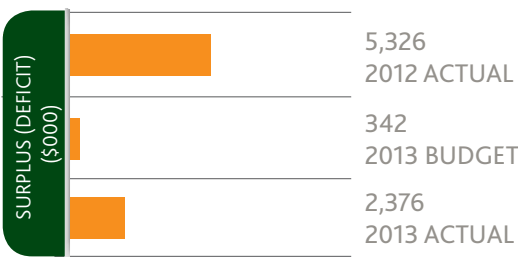
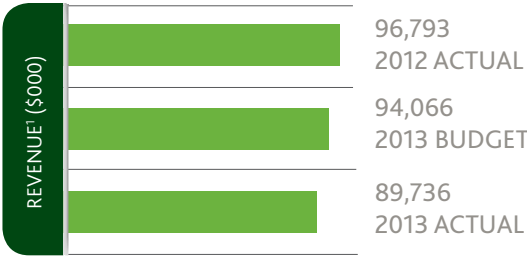
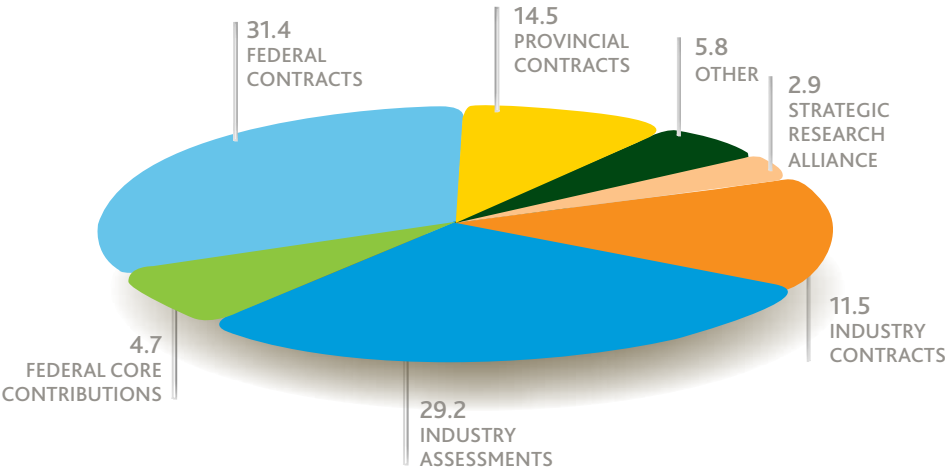
Yves Nadon

Chief Financial Officer

# Financial Results as at March 31, 2013

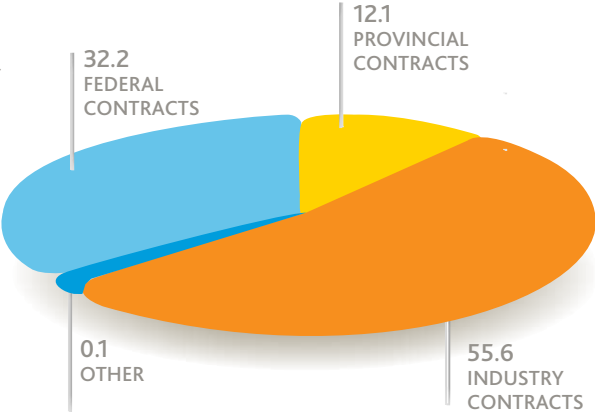
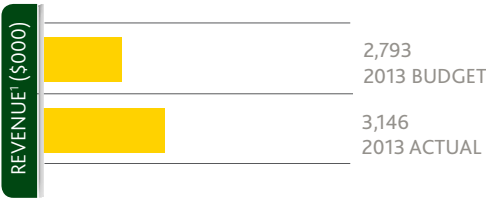
## FPInnovations Consolidated

REVENUE SOURCES (%)



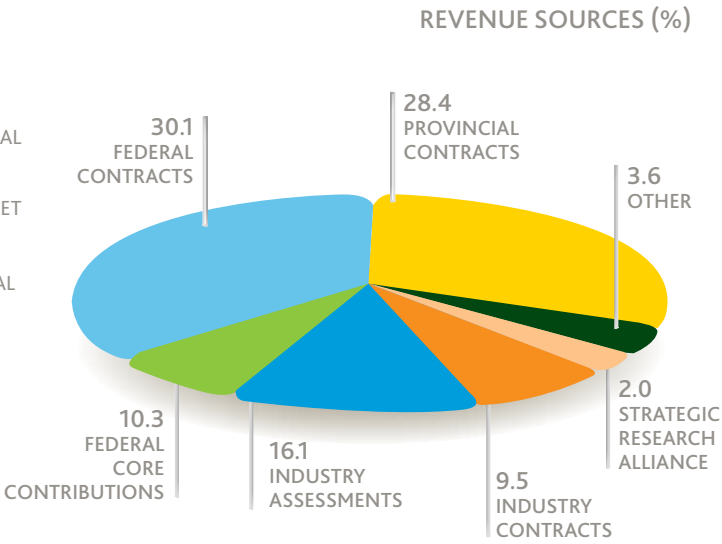
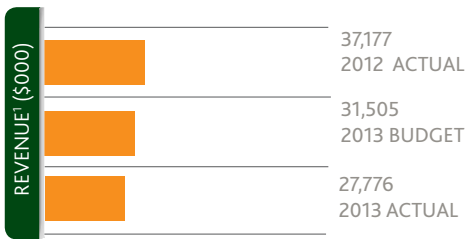
## BUSINESS DEVELOPMENT

REVENUE SOURCES (%)

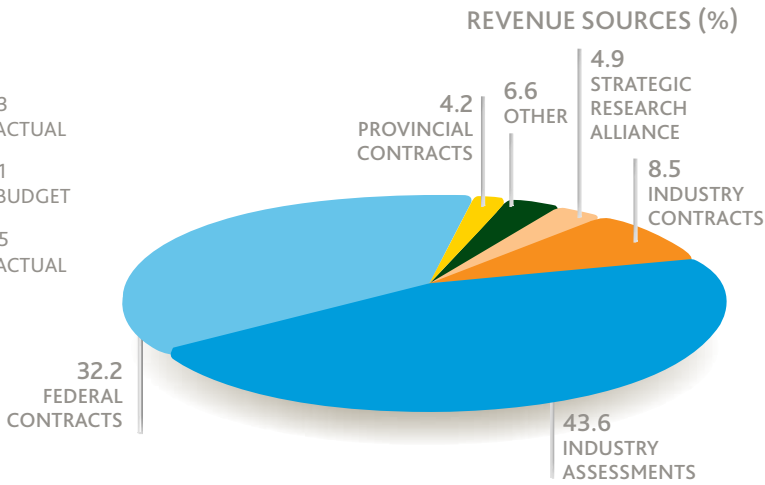
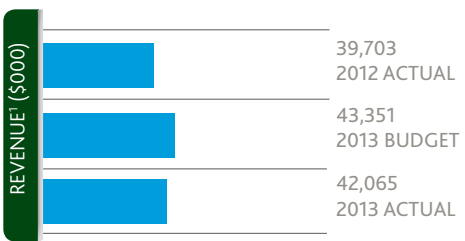


<sup>1</sup>BEFORE NON-RECURRING PROJECTS.

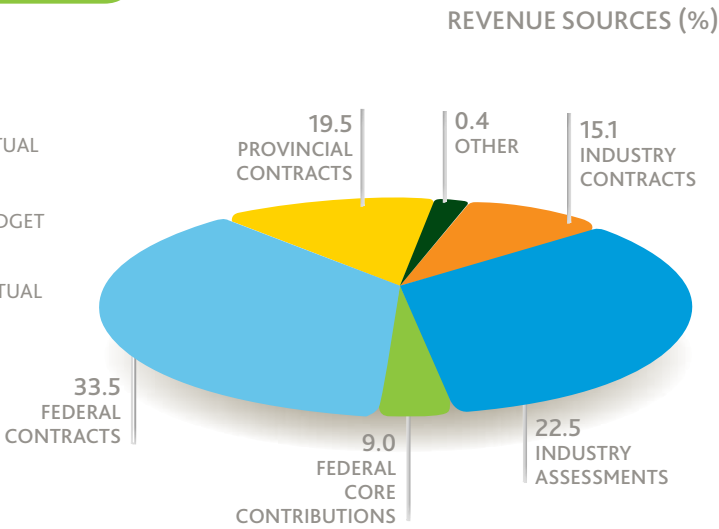
WOOD PRODUCTS



PULP, PAPER AND BIOPRODUCTS



FOREST OPERATIONS



Message from the  
**EXECUTIVE VICE PRESIDENT**



**Alan Potter**  
Executive Vice President

**CUSTOMERS  
are our  
FOCUS!**

HERE AT FPINNOVATIONS, WE KNOW THAT WE ARE IN CHARGE OF THE FOREST OF TOMORROW. THERE IS A LOT RIDING ON OUR RESEARCH, BEING A WORLD LEADER IN INNOVATING AND DELIVERING STATE-OF-THE-ART SOLUTIONS FOR EVERY AREA OF THE SECTOR'S VALUE CHAIN. THIS IS THE REASON WHY OUR RESEARCHERS, ENGINEERS AND SCIENTISTS HAVE BEEN BUSY TURNING THEORIES INTO PRACTICAL SOLUTIONS, AND CONVERTING R&D KNOWLEDGE INTO INNOVATIVE AND MARKETABLE SOLUTIONS.

We are proud to showcase—in our *Review of Activities*—how FPIInnovations is creating true innovation that will last for years to come. Our research helps member companies explore new markets in innovative ways, transform manufacturing processes, do more with less and raise quality, while at the same time lowering production costs. In addition, we are helping the industry continue to be environmentally aware. All these endeavors are a testament to the fact that we are in line with the Forest Products Association of Canada's Vision 2020—that the Canadian forest products industry will power Canada's new economy by being green, innovative and open to the world—and I am proud to say that our efforts are working!

Vision 2020 focuses on three components that are essential to the industry's future: attracting talent, improving environmental footprint, and generating additional economic activity from new innovations and growing markets. Simply put, the focus is on *people, performance and products*, and FPIInnovations epitomizes all three. The forest sector must attract at least 60,000 new workers within the next decade, as the industry transforms itself. Our *people* rank among the world's most knowledgeable and skilful engineers, scientists, technicians and specialists; and they conduct numerous research projects to provide the next generation of forest workers with appealing career opportunities and ensure secure work environments. FPIInnovations coordinates these efforts with partner university networks that offer innovative learning platforms to undergraduate and graduate students. In terms of *performance*, FPIInnovations has been leading the way in sustainable business practices and helping companies step up their environmental efforts by engaging in sustainability initiatives. The *products* we develop help members improve competitiveness and transform the existing industry into one that is rooted in the bioeconomy. At FPIInnovations, we are applying our technical knowledge to assist member companies with creating opportunities for markets beyond Canada, while defending the existing ones. You can read about our efforts in the *Review of Activities*, which also highlights our true



global collaboration through partnerships among industries, universities and research institutions, so that we can deliver on the forest sector's Vision 2020.

FPIInnovations is accustomed to strategic partnerships, being the outcome of one itself. FPIInnovations was created in 2007 by merging three independent research organizations into one, and then adding a fourth—Natural Resources Canada's (NRCan) Canadian Wood Fibre Centre (CWFC). The CWFC provides FPIInnovations with forest-level research services and responds to the research direction set by FPIInnovations' National Research Advisory Committee to improve forest productivity and increase the value of Canada's wood resources. Looking ahead, FPIInnovations is eager to continue its close collaboration with NRCan and its Canadian Forest Service, and come up with new products and processes that embrace and exploit advances in new and emerging transformative technologies.

The *Review of Activities* details our success in developing these new technologies and applications for our existing traditional products and developing new revolutionary products such as cellulose filaments—an exciting new material whose properties can improve a wide array of products, including pulp and paper, packaging, composite materials, wood products, bioplastics, paints, inks, varnishes, textiles and cosmetics. We are truly excited that our knowledge is being applied to sectors beyond forestry and we are extremely motivated and thrilled about all the possibilities. The forecast for our sector's growth is extremely heartening and it clearly shows that the sun has not set on our industry. We have a sunrise industry with a dynamic future that is brimming with opportunity.

Through innovation, a new era in the forest industry is beginning to take hold across the country. We are ready—and consequently, our members are ready—because innovations are sprouting at FPIInnovations day after day after day...



**Alan Potter**

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Executive Vice President

Our Programs at a Glance



and  
Review of  
**Activities**



# Our Programs at a Glance

## RESOURCE ASSESSMENT

Building the tools and technologies to identify wood fibre characteristics and their location; as well as grow improved fibre to optimize the sustainability and economics of the forest sector.

## FOREST OPERATIONS

Seeking innovative solutions in the areas of harvesting operations, transportation and energy efficiency, precision forestry, resource roads, forest feedstocks and silvicultural operations.

## WILDFIRE OPERATIONS

Delivering practical solutions to issues affecting the wilderness firefighting community.

## PRIMARY WOOD PRODUCTS MANUFACTURING

Providing applied research, company-specific confidential services, and technical support to Canada's lumber and engineered wood producers through two Primary Wood Products Manufacturing program components: Lumber Manufacturing and Engineered Wood Products Manufacturing.

## SECONDARY WOOD PRODUCTS MANUFACTURING

Providing research, development and technical support for secondary wood products manufacturers to enable them to effectively produce and market wood-based products and construction materials.

## ADVANCED BUILDING SYSTEMS

Providing knowledge and innovative technical solutions for expanding the use of Canadian wood products and building systems. This program addresses the safety, durability, affordability, environmental and occupant comfort aspects of wood building performance.

## **MARKET PULP**

Improving the competitiveness of market pulp mills by developing and implementing new technology that can reduce production costs, increase productivity and support market development.

# REVIEW of ACTIVITIES

## **BIOMATERIALS**

The objective of the Biomaterials program is to develop non-traditional wood products in order to enhance the value of all parts of the resource, including residual products, so as to diversify wood markets and contribute to developing a new bioeconomy.

## **PAPER, PACKAGING AND CONSUMER PRODUCTS**

Addressing technical needs and providing technical and market support to member companies who manufacture printing and writing papers, packaging and consumer products.

## **PERFORMANCE INNOVATION TRANSPORT (PIT)**

The objective of the Performance Innovation Transport (PIT) program is to offer customized technological solutions and assistance to fleet managers who want to reduce the cost and environmental impact of their operations or improve operational safety.

## **BIOREFINERY AND ENERGY**

The Biorefinery and Energy program develops novel bio-based chemicals and bio-energy pathways from wood, with a focus on integration with existing forest industry infrastructures.



**HUMAN RESOURCES**

# HUMAN RESOURCES



## Supporting Our Most Important Resource: People

As a knowledge-driven research business, the successful operations of FPIInnovations depend—first and foremost—on an efficient and strategic use of its intellectual capital. The personal commitment of each employee, guided by clear corporate objectives, ensures that research programs provide the best value to members and clients.

Continuing its upward trend towards engaging in open communication with all of its partners, FPIInnovations is striving to incrementally improve its multidisciplinary value proposition. Over the past year, FPIInnovations placed significant effort on improving its customer relations and also focused on supporting networking and teamwork, training and developing highly qualified personnel as well as creating solutions to help attract the next generation of forest workers. These orientations are converging to create an environment where human resources, fused with improved information technology, are truly becoming the cornerstone of the innovation process.

## Tomorrow's Workforce

In line with the Forest Products Association of Canada's Vision 2020, FPIInnovations acknowledges that the forest sector must attract tens of thousands of new workers within the next decade. Research efforts in this regard were undertaken to provide the next generation of forest workers with appealing opportunities. Whether through the development of decision-enabling processes, such as the innovative 1-2-3 selection cutting method; through the design and implementation of FPSuite™ software and hardware directly in forest operations machinery; or even through the implementation of automatic shifting transmissions for log trucks in order to facilitate driving, new forest industry workers will be better informed and better equipped and will play more important roles within their organizations. FPIInnovations coordinates these efforts with partner university networks that offer innovative learning platforms to undergraduate and graduate students. Industry professionals also benefit from FPIInnovations' expertise, in areas such as Eco-driving Techniques, Robotics, Lumber Drying and Lean Manufacturing.



## Health and Safety

FPIInnovations is dedicated to ensuring safe work environments. Aside from the occupational health and safety measures strictly enforced by local teams within every FPIInnovations' office and laboratory, researchers have investigated risk issues faced by various types of forest industry workers such as: musculoskeletal injuries for tree planters; identification of hazardous road conditions, faults and deficiencies that may lead to serious collisions and road-use problems; and ergonomic load wrapping and gear shifting techniques. Following these investigations, guides and videos were produced and distributed to members.

## Same Dedicated Staff, Brand New Structure

Acting on new market realities, FPIInnovations has reorganized its internal research structure. A market-oriented structure was designed and efficiently put in place to better support and advance the research and technology transfer goals of each research program. One of the key advantages of this structure is to be able to provide local and customized responses to widespread and broad cross-sectorial questions regarding important issues for the forest industry.

FPIInnovations' employees rank among the world's most knowledgeable and skilful engineers, scientists, technicians and specialists. Many are

recognized by various national and international standards organizations, such as ASTM or ISO, for many years of dedication and commitment to the development of standards.

FPIInnovations' employees are also encouraged to pursue training and attend conferences to keep up to date with the latest technologies, knowledge and processes. Industry Advisors, for example, attend regular seminars on the approach, benefits and challenges stemming from the various research projects sparked by industrial needs.

With more than 500 employees located across Canada at its main offices, laboratories and technology transfer offices, FPIInnovations is able to provide technical assistance to every industrial and governmental facility active on the forest sector value chain and beyond.

FPIInnovations' wide range of expertise includes: improving products; developing operational processes; implementing new equipment and new technologies; examining new market opportunities; and increasing value and profitability. FPIInnovations' research teams also carry out customized technical support and training—both in-plant and in the field—to organizations of all sizes.

The funding from Natural Resources Canada to focus on transformative technologies research has attracted a number of young researchers to the university forest sector networks and to FPIInnovations. These young researchers are studying the forest resource from all angles; we probably now have more skilled young people studying cellulose and lignin than we had 20 years ago. They are the ones developing solutions for tomorrow's forest products industry.

**FPIInnovations' research teams also carry out customized technical support and training—both in-plant and in the field—to organizations of all sizes.**



We believe FPInnovations' dedicated focus on the forest industry's human capital, through research on safe, smart and sound work environments, will help attract the next generation of dedicated workers and enable the industry to move forward in the global bioeconomy.

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## MARKETS and MARKET ACCESS

# MARKETS and MARKET ACCESS



## Securing New Markets, Protecting the Present

Canada’s forest industry is undergoing a self-styled transformation, involving a major market shift towards Asia and other emerging markets. FPIInnovations is in the forefront of this process, monitoring its impact on Canadian forest products and helping position Canadian companies to capitalize on new opportunities. FPIInnovations is helping our member companies in new markets—in Canada and around the world—and in the existing ones.

## Australasia: Expanding and Safeguarding

The declining demand for traditional pulp and paper products in North America and Europe, combined with the flourishing Asian pulp and paper industry, has created a significant market shift, particularly for Canadian market pulp producers. To further aid our member companies in understanding emerging issues, current concerns and the latest developments in standardization, FPIInnovations has published a special report entitled *Emerging Trends and Issues in International Standardization of Forest-based Products: What Should Canada Watch For?* This report helps the Canadian industry ensure its competitiveness by being well

positioned to meet new regulations and sustainability requirements.

The burgeoning Chinese industry has created a high demand not only for raw materials and new technologies, but also for technical products and services. FPIInnovations is supporting the Canadian industry in its efforts to supply an emerging market with high-yield pulp (HYP), thereby creating new opportunities for our member companies. One sector with significant potential is sanitary papers, specifically tissue and towel. As a result of our efforts, Canadian HYP manufacturers can expand further into China’s hygiene products’ market, which has shown strong growth. FPIInnovations is leading collaborative, Canadian–Chinese R&D workshops to help Chinese mills increase the HYP level in their furnish, by promoting the unique features and advantages of Canadian HYP products.

FPIInnovations took part in the China Paper Show held in Shanghai in September and signed an agreement to market our expertise and services in paper manufacturing, production cost optimization and paper performance to the huge Chinese pulp and paper market. There is an

opportunity for our members, specifically pulp exporters, to benefit from China's market growth and increase their market share in what has become the largest destination in the world for pulp imports.

FPIInnovations has been active in China for the past ten years, with the Advanced Building Systems group significantly contributing to the development of the Chinese Timber Structural Design Building Code in 2004. The Code features a detailed chapter on North American-style wood-frame construction, which presented a tremendous opportunity for the sale of Canadian wood products to China. This type of commitment to international research, codes and standards and other technical committees helps the sector maintain markets and develop new ones for Canadian wood products, by ensuring that building codes and standards are consistent with Canadian products and building approaches. At present, FPIInnovations—in collaboration with the University of British Columbia and Simon Fraser University—is developing statistical tools for lumber monitoring that are being used to ensure the continuing competitiveness of the design values for Canadian lumber in world markets.

In Australia, a \$33-million market for Canadian logs and lumber, FPIInnovations' phytosanitary research has proven very valuable in safeguarding Canadian market access. Many devastating pests have been spread via wood products and many countries are increasingly vigilant in preventing this. In 2008, Australia

implemented quarantine measures in the belief that bluestain fungi was posing a threat to its forest industry. Last year, FPIInnovations presented crucial science-based information, at International Forest Quarantine Research Group meetings, which prompted Australia to reverse its policy of rejecting wood products with live bluestain. Facts presented by FPIInnovations assured Australia that current scientific data do not support the view that this fungus should fall under the category of quarantine pests.

**FPIInnovations has been active in China for the past ten years, with the Advanced Building Systems group significantly contributing to the development of the Chinese Timber Structural Design Building Code in 2004.**

## Encouraging Adoption of CLT Systems

Closer to home, FPIInnovations published a guide to cross-laminated timber (CLT) applications in accordance with United States codes and standards, and in collaboration with the American Wood Council, the USDA Forest Products Laboratory, APA and U.S. WoodWorks. In 2011, FPIInnovations published the Canadian edition of the *CLT Handbook* to facilitate the adoption of CLT in Canada.

CLT is gaining popularity around the globe for residential and non-residential applications. It offers outstanding structural, thermal and acoustic performance and enables new open-plan designs as well as faster, cleaner, safer and less noisy worksites.

The purpose of the *CLT Handbook* is to provide technical information on the design, construction and implementation of CLT systems, thereby encouraging the adoption and selection of wood-based solutions for

residential, non-residential and multi-storey construction. The *CLT Handbook* is expected to pave the way for new U.S. non-residential building markets for this emerging wood product.

## On Our Own Turf

In the Canadian market, there is huge potential for introducing alternate wood building system solutions geared toward a number of industry sectors, including platform-frame wood construction, heavy timber-frame construction, CLT and hybrid construction. FPInnovations is focused on strengthening its member companies' markets in Canada and is striving to support a strong market position for wood in sustainable construction as well as supporting federal and provincial wood-use initiatives. FPInnovations, along with the Homeowner Protection Office in BC, has co-sponsored the newly released *Illustrated Guide for the Seismic Design of Houses* to assist builders and designers with the forthcoming new regulations in the BC Building Code. FPInnovations also launched a building acoustic research project last year to develop design and construction solutions as well as installation guides to improve the sound insulation of wood multi-family buildings.

**FPInnovations, along with the Homeowner Protection Office in BC, has co-sponsored the newly released *Illustrated Guide for the Seismic Design of Houses* to assist builders and designers with the forthcoming new regulations in the BC Building Code.**





**TRANSPORTATION**

# TRANSPORTATION



## Transforming the Transportation Sector

Striving to maintain their leadership position in an increasingly competitive world, Canadian industries are supporting FPIInnovations in its efforts to provide technological solutions for efficient, safe, low-cost and environmentally friendly transportation of resources and products.

## Working Environments

Once again this year, FPIInnovations researchers have gone to great lengths to help create a smarter and more attractive transportation industry. Working closely with government agencies as well as industrial members and university partners, researchers have developed important tools relating to safety issues for truck drivers and forest machine workers. For example, a video was produced that presents an ergonomic load-wrapping technique for truck drivers. Much work was also accomplished this year to examine the ergonomic and operational benefits of automated transmissions in log trucks. These tools and techniques will not only facilitate the truck driver's job and increase safety, but they will also undoubtedly help recruit and retain the next generation of forest workers searching for work environments that are less physically—but more mentally—challenging.

## Ultra-Light Trailer

This year's innovations include the final development of composite stakes and crossbeams, resulting in an ultra-light log trailer. The innovative material weighs 40% less than steel. Built to increase log payloads without compromising safety and to reduce fuel consumption, these trailers can carry more logs and use less fuel when travelling empty. Put on display for the industry at tradeshow such as Demo International, the ultra-light trailer has been subject to many improvements in the last year and is now market-ready and available for purchase. Future developments involving reducing trailer weight even further are ongoing and appear very promising.

## Off-Road Energy Efficiency

FPIInnovations worked toward better determining and optimizing fuel consumption within forest operations, completed the development of a Web-based benchmarking tool and further developed an electronic fuel



management and recording system for remote operations. This last development can electronically store data on fuel dispensed from a central reservoir to the various machines in operation. It will allow members and their contractors to control their fuel disbursement and implement fuel reduction measures. It has also enabled FPInnovations to conduct many off-road fuel studies to compare the impact of various operating techniques.

Controlled fuel tests—comparing tandem drive to tridem drive trucks having the same total number of axles and the same payloads—were also conducted in 2012–2013, in collaboration with an industry member. The effect of higher payload on energy consumption per unit of transported product (energy intensity) was also analyzed.

PIT's extensive expertise as well as its proven track record continue to attract new clients and projects. At the end of 2012, the transit sector—through the Canadian Urban Transit Association (CUTA)—requested PIT's support to determine transit bus specifications for better energy efficiency. As provincial and federal governments will most likely invest more in public transit over the coming years, it is important for PIT to be adequately prepared and appropriately positioned to make the best decisions in order to positively influence the urban transit market.

With 26 private fleet members, 16 municipalities and 4 federal and provincial government agencies, FPInnovations' PIT group is increasingly becoming the centrepiece of a unique transportation hub. The services that PIT researchers provide include vehicle telemetry, selection of vehicle components, driver training, fleet audit and energy management plans, logistics, road conditions expertise, acting as guest speakers or trainers in various fields as well as assisting in carrying out greenhouse gas inventories.

## Innovative Services for Transport Fleets and Municipalities

Since 2008, FPInnovations' Performance Innovation Transport (PIT) team has been helping fleet or municipal member organizations make the best strategic decisions concerning their vehicles. Both 2012 Energotest campaigns once again separated the effective from the non-effective technologies in terms of higher fuel efficiency and lower emissions of greenhouse gases for highway trucks. Energotest allows fleets to choose the most efficient solutions, while giving technology suppliers an opportunity to redirect their development efforts.



**COMPETITIVENESS  
and COST REDUCTION**

# COMPETITIVENESS and COST REDUCTION



## Competitiveness and Cost Reduction: Finding Solutions

Rising cost pressures are fast becoming a major concern for the forest industry. Amid the continuing economic uncertainties, member companies are turning to FPIInnovations for help to boost the competitiveness they need in order to stay ahead of the game and reduce production costs through our various science-based research programs.

## Strengthening Support for Market Pulp Producers

Businesses across the forest industry are burdened by the global economic slowdown, and the pulp and paper sector is not immune to the difficulties. With demand for the printing and writing paper grade falling steadily in North America, demand for northern bleached softwood kraft (NBSK) for reinforcement application has also dropped. To help NBSK producers diversify and target the growing tissue and towel markets, FPIInnovations

collaborated with industry partners to develop a new methodology for evaluating the tissue- and towel-making potential of NBSK, and to carry out pilot-scale furnish optimization trials using FPIInnovations' unique pilot tissue machine to demonstrate the advantages of NBSK for enhancing tissue runnability and performance.

World tissue consumption is forecast to increase 4.5% in 2013 and FPIInnovations' initiative will support pulp manufacturers in optimization of pulp quality, reduction of production costs and strengthening of their position on the growing tissue and towel markets.

FPIInnovations has developed a new tissue research strategy to support Canadian market pulp producers in being more competitive in the current marketplace. To further strengthen this tissue research program, FPIInnovations now has the capability of testing tissue softness through its handfeel softness panel. The search to perfect softness, while keeping in balance other important attributes such as strength, has been a high priority for product optimization and new product development. Implemented as a measurement tool, the handfeel softness panel has already tested its strict methodology to evaluate the softness of tissue produced by FPIInnovations' pilot paper machine. This represents a great opportunity for FPIInnovations to take the lead in standardizing the handfeel panel method and to support members with the development of more competitive products.



## Reducing Costs of Chemical Usage at Kraft Pulp Mills

After fibre and labour costs, chemicals are the next highest operating cost for Canadian kraft pulp mills. Since most of these chemicals are produced using a lot of energy, their cost is expected to increase further, in line with skyrocketing energy prices. Over the last few years, FPIInnovations has developed processes and technologies for reducing chemical usage at kraft pulp mills. One example is the near-neutral bleaching process, which reduces chlorine dioxide and corresponding sodium chlorate requirements. Another is the Generator Acid Purification system (GAP-S). With GAP-S, kraft pulp mills can produce purified sulphuric acid, which can be used in place of purchased acid and reduce caustic make-up requirements, resulting in annual savings of as much as \$1 million.

## Cost Reduction Through Improving Paper Machine Efficiency and Optimizing Pressroom Runnability

Paper machine efficiency and pressroom runnability have become a large issue, with the pressure to reduce furnish cost and move toward the production of more paper grades with lower volume. FPIInnovations has been developing diagnostic and analytical tools to help mills optimize paper machine efficiency and pressroom runnability. For example, the portable moisture sensor has been used to validate the improvement in moisture uniformity on paper machines that is achieved through steam box installation. The permeability and microscopic analysis helped two mills address cockling and fluting issues on paper machines, creating business impacts of more than \$5 million per year for these two mills. The strength uniformity analysis with the PapTune™ software tool helped one mill optimize its furnish blend, leading to cost savings of over \$2 million per year.

## Wood Products Manufacturing Innovations

Similarly, wood products manufacturers are keeping a close eye on costs and placing emphasis on increasing efficiency to help mitigate the effects of the challenging global economy and its impact on their bottom line.

For sawmills, log rotation inaccuracies can result in huge financial losses each year, which can be minimized at relatively low cost and effort by making adjustments after precisely assessing rotation errors. FPIInnovations' Vision System uses two cameras to take pictures of the log end before and after the log is rotated, following which FPIInnovations' Rotation Verifier Software will determine the rotation angle by correlating the log images before and after the rotation. FPIInnovations' Log Rotation Verification System collects information from several sequential log breakdown processes, linking decision-making and information systems together for analysis and control. The improved accuracy adds annual benefits of \$150,000 to \$500,000 per line.

FPIInnovations is also helping members develop flow simulation to investigate potential production improvements. Flow simulation allows mills to evaluate their operation with a virtual sawmill/planer mill. This reduces the uncertainty and learning curve of mill changes and upgrades when applied to the real world.

An updated version of Optitek, FPIInnovations' sawmill simulation

software, was released in October of last year. The technology allows sawmill managers to optimize their actions in the wood fibre value chain. The new module allows sawyers to practice sawing decisions over and over without using real logs and wasting lumber.

In the area of drying and heat treatment, FPIInnovations has been active in helping members reduce drying time and costs, such as for mountain pine beetle (MPB)–attacked wood. Companies are faced with challenges related to drying the MPB-attacked wood due to its lower moisture content. There is a risk of over-drying and recovery loss, not to mention lost kiln and planer productivity and excessive energy consumption, as lumber must remain in the kiln longer than necessary to fulfill phytosanitary requirements. To assist mills improve productivity and reduce costs, FPIInnovations continues to support the development of site-specific heat treatment schedules in order to improve the bottom line of the drying operation, while still satisfying phytosanitary regulations. The initiative has been endorsed by the Canadian Food Inspection Agency, the government agency responsible for phytosanitary measures related to the import and export of wood products.

In plywood manufacturing, veneer drying consumes over 70% of a plywood mill's heat energy. Veneer sheets usually have wet spots, but conventional drying methods apply heat uniformly to the whole sheet, causing problems of over-drying in the dry areas and under-drying in the wet areas. To reduce energy use and improve veneer quality,

FPIInnovations has established a new green veneer sorting strategy through its VDry model, which can be customized to mill-specific drying parameters and hot stacking practices. This strategy can help mills achieve higher drying productivity and better veneer quality while minimizing energy consumption.

Effective drying is not the only concern for plywood mills, as they have to contend with the cost of extenders/fillers used in the phenol-formaldehyde (PF) glue mix, which has nearly doubled in the past years. For an average mill, the extender/filler cost is about \$400,000 per year. FPIInnovations is helping member companies cut this cost by finding applications for lignin—one of the most abundant organic polymers on earth and a by-product from chemical pulping processes—to serve as a substitute extender/filler in the PF glue mix. This would significantly lower plywood production cost and at the same time increase the efficiency of pulp mills.

At a Canadian oriented strandboard mill, FPIInnovations successfully tested a prototype scanning system in December 2012. The technology can provide mills with simultaneous, real-time measurements of fines, strand width and alignment.

## Minimizing the Cost Impacts when Partial Cutting is Required

In the area of Forest Operations, FPIInnovations has been actively developing tools and methods, including operationally practical and cost-effective partial cutting practices to help members reduce operating costs when these approaches are required.

Although partial cuts may contribute toward supporting the allowable annual cut levels and maintaining the quality of the growing forests, the higher cost associated with the execution has limited their large-scale deployment. However, FPIInnovations has successfully developed a simplified method called the 1-2-3 technique to implement tailored treatments for most forest conditions. The

choice of trail patterns and tree selection process are customized to the stand conditions, treatment objectives and equipment used. The technique is now implemented by several members for boreal or tolerant hardwood forests, as well as for mature stands and commercial thinning applications.

FPIInnovations was approached by the Nova Scotia government to conduct a comparative economic study of clearcut versus non-clearcut harvesting in the province. Nova Scotia has introduced a new guideline for harvesting timber, whereby a maximum of 50% of the area can be harvested with clearcutting and the balance must be done by some form of partial cutting. Because FPIInnovations has developed proven tools and training methods to reduce operating costs in partial cuts and ensure that the desired silvicultural outcomes are achieved, it has been commissioned to evaluate the cost implications of implementing partial cut harvesting and meeting this new guideline. The analysis will allow Nova Scotia's Department of Natural Resources to understand the economic implications of the new guideline on the local forest industry.

FPIInnovations has investigated and classified potential end-uses for wood waste generated from construction and demolition activities in the region, as most of the wood waste can be re-used and recycled into value-added products. Recommendations have been made to develop wood waste handling practices and infrastructure to prevent wood from being mixed with other segments of the waste stream and establish a waste disposal fee structure to make it economically advantageous for wood waste handlers to deliver wood in a condition that is suitable for recycling, reprocessing and re-use.

## Re-use Opportunities for Used Building Materials

Cost consciousness is becoming the norm not only for member companies and provincial governments, but also for cities and municipalities. FPIInnovations has partnered with Metro Vancouver in a study of the re-use of used building materials as part of the latter's Integrated Solid Waste and Resource Management Plan, which aims to increase the region's waste diversion rate from 55% to 70% by 2015. The wood waste discarded from the region is generated primarily from the demolition and renovation of wood-frame buildings. The current practice of delivering wood mixed with other waste makes it difficult and expensive to extract even fuel-quality wood from the waste stream.



**TRANSFORMATIVE  
TECHNOLOGIES**



# TRANSFORMATIVE TECHNOLOGIES



## Rethinking Forest Products in the New Market Era

Natural Resources Canada's Transformative Technologies (TT) Program brings FPInnovations together with government, industry and university partners to seek new products and processes to rejuvenate the Canadian forest products sector.

FPInnovations' research projects conducted under the TT Program provide for long-term initiatives that embrace and exploit advances in new and emerging transformative technologies. These technologies are not only designed to help reduce costs and provide continuous product improvements, but they also aim at creating changes in the forest sector through novel and strategic uses for wood fibre and the development of innovative high value-added products.

## Next Generation of Adhesives

This year, FPInnovations' extensive research work on cellulose nanocrystals (CNC) led to a greater understanding of their properties. For example, projects supported by the TT Program, in partnership with industry members, studied CNC as a reinforcing agent in synthetic wood adhesives. Recent findings confirmed improved resin bonding durability and quality for plywood products as well as increased bending strength for oriented strandboard. This confirms that CNC holds great potential in the development of

specialized adhesives for the manufacturing of engineered wood products.

Over the past few months, many FPInnovations-led Patent applications have been published, concerning the use of wood and cellulose bioproducts in transformative technologies. Combining FPInnovations' knowledge and expertise in research fields such as mycology, extraction and biocomposites as well as engineered wood products, researchers have invented a process to create a new, low-cost, environmentally friendly wood adhesive for composite panels, using a renewable source. Wood adhesives currently used are generally composed of formaldehyde, a volatile and toxic organic compound known to be a human carcinogen. FPInnovations' new proprietary process takes advantage of the adhesive properties of chitosan, a derivative of chitin. Chitin is the world's second-most abundant natural biopolymer, right behind cellulose, and is naturally produced in enormous amounts in the shells of marine crustaceans, such as crabs and shrimps, as well as in the fungi cell wall. Modified by specialized

fungi into chitosan, chitin is destined to play a major role in the development of the next generation of green adhesives.

Another invention patented this year is a novel adhesive composition and process for producing a heat-resistant wood adhesive that is suitable for highly durable formaldehyde-free engineered wood products. Composed of polyurethane (PUR)—one of the most common ingredients in formaldehyde-free adhesives—the new adhesive developed within the TT Program had to overcome PUR's fire vulnerability. Wood adhesives are an essential component of any engineered wood product and as such they must comply with fire safety provisions.

## Whitewater Flotation Column

FPInnovations' researchers were also very proud this year to announce the successful start-up of the world's first industrial flotation column for whitewater cleaning at a paper mill producing newsprint from TMP. Designed and built with the support of the TT Program to improve paper properties and paper machine runnability and speed by acting as a kidney—constantly treating a portion of recirculated whitewater and selectively removing softwood pitch (sticky wood resin) and dark extractive-rich fines—the fully automated, 33 m<sup>3</sup> whitewater flotation column has now been successfully operational for over 12 months. Throughout 2012, the technology's removal efficiency

rated between 30% and 40% of extractives from paper machine excess whitewater, reducing paper machine deposition problems, improving sheet brightness and strength, and making it possible to double the use of mountain pine beetle-attacked wood (from 8.3 to 16%), while maintaining a premium newsprint product.

## Precision Forestry Technological Platforms

Precision forestry enabling technologies such as FPDat™ and FPTrak™ are increasingly becoming essential tools for operators, entrepreneurs and forest companies seeking to improve harvesting performance. Consisting of navigational tools that provide operational, data gathering and communication solutions, FPInnovations' precision forestry platform provides a centralized monitoring system for better control and faster decision-making. Since their arrival on the market, over 250 FPDat units have been sold and more than 300 machines are being monitored using FPTrak.

FPDat is an on-board computer designed to collect and analyze information on the performance and productivity of machines. A promising new FPDat module in development over the past year is designed to optimize the efficiency and competitiveness of road construction and maintenance by using innovative technology to precisely monitor the activity of graders, such as the working position of their blades.

In response to clients' needs and demands, much effort was invested in upgrading FPTrak's reporting options, in developing a mapping tool to estimate the productivity of felling machines using the harvested areas, and in developing a process to enable importing manufacturers' on-board computer production data. Equipped with customizable alert systems, these tools will eventually help forest machine operators stay on target and

within harvest area boundaries, by sending SMS or email messages, for example.

## Smart Coatings

Initially developed for the automotive industry, smart coatings are structured to react to outside conditions, such as temperature, stress or strain. FPIInnovations is adapting and developing smart coatings for the wood industry. Whether developed to be self-cleaning, self-healing, thermochromic or electrochromic, they undoubtedly represent the future of coatings. This year, research projects demonstrated the great potential of some of these innovations—for example, self-healing formulations that achieve significant gloss recovery and reduce scratch size (length and width) on wood products. The tested formulations include two-component, solvent-based polyurethane systems, for both low- and high-gloss finishes, with the ability to sustain multiple deformations.

Cool coatings (IR-reflective coatings) are another innovative finishing product being investigated by FPIInnovations. On wood products, the use of IR-reflective coatings is expected to limit resin exudation caused by high temperatures and cracks. Recent research results indicate that IR-reflective pigments can reduce heat build-up in wood samples by as much as 20%.

Another innovative transformative technology investigated this year by FPIInnovations involves the adaptation and development of advanced finishing products polymerized through exposure to microwaves for the forest products industry. Since the installation of a semi-industrial microwave generator in the Québec laboratory, research teams have demonstrated the great potential of microwave curable impregnation products on wood samples. This project aims at designing a low-cost and seamless impregnation treatment embedded within the sawmill production line.

**FPIInnovations is adapting and developing smart coatings for the wood industry. Whether developed to be self-cleaning, self-healing, thermochromic or electrochromic, they undoubtedly represent the future of coatings.**



ENVIRONMENT

# ENVIRONMENT



## Environment: The Way We Green

The environment is back on center stage, thanks to an increasing number of companies and consumers thinking green, and FPIInnovations is at the forefront of this environmental innovation and development.

FPIInnovations has been leading the way in sustainable business practices and helping companies step up their environmental efforts by engaging in sustainability initiatives.

## Solving a Persistent and National Environmental Problem

In Canada, the Environmental Protection Act regulations require each pulp mill to conduct fish studies in rivers and lakes every three years, to ensure fish and habitat protection. The first five cycles (15 years) of the Environmental Effects Monitoring program identified a national pattern that showed fish downstream of pulp mills as having larger bodies with proportionally smaller gonads, indicating a potential effect on reproduction.

Over the past five years FPIInnovations, working in collaboration with government scientists and Canadian universities, identified a laboratory fathead minnow egg production test that was able to predict the

effects that were observed in the field. In 2011–2012, a comprehensive study was conducted to determine the cause and solutions to this problem that has affected the industry for so long. The results of this undertaking gave rise to the largest database in the world on effluent quality in relation to fish reproduction and resulted in potential solutions being identified for each major pulping sector.

The research conclusively showed that the effect on egg production was related to the discharge of biological organic material (BOD) from the mill. It was concluded that a target final effluent BOD level of 20 to 25 mg/L would result in improved effluent quality and lead to the elimination of effects on fish reproduction. Mill engineers now have a clear goal with respect to good effluent quality with a target that can be achieved through optimization of the biological treatment plant, spill minimization and the reduction of BOD throughout the process.



## Environmental Product Declaration

Being green has become a great marketing tool, but buyers are confused by the hundreds of eco-logos in use worldwide and they want real evidence of a product's environmental footprint. FPIInnovations has therefore developed the infrastructure for wood Environmental Product Declarations (EPDs). An EPD is a standardized, life cycle assessment (LCA)-based document that conveys the environmental performance of a product or system, and addresses energy consumption, water consumption, global warming, waste and air emissions, among other common environmental metrics. FPIInnovations has developed the first two EPDs for North American wood products. Using that infrastructure, the American Wood Council and the Canadian Wood Council are leading the development of six generic EPDs for North American products: softwood lumber, softwood plywood, oriented strandboard, glulam, I-joists and laminated veneer lumber. These EPDs, produced on behalf of the entire sector, are made possible due to several years of investment by FPIInnovations in preparing the infrastructure, in addition to long-running development of wood product LCA data by FPIInnovations and other researchers.

EPDs are the environmental version of a nutrition label, able to guide more consumers to make sustainable choices, which ultimately help to reduce their overall environmental impact.

## Cellulose Nanocrystals

FPIInnovations is a world leader in cutting-edge discussions about the key sustainability challenges and opportunities facing the industry today. One of its most exciting research avenues involves developing new materials such as cellulose nanocrystals (CNC).

CNC is cellulose in crystalline form extracted from woody biomass. Its key features such as high strength, electro-magnetic response and a large surface area provide new sustainable business opportunities through the manufacture of new and advanced materials using nanotechnology.

Over the last five years, FPIInnovations has worked extensively on the development of new applications for this fascinating substance. In January 2012, CNC was approved for unrestricted manufacture and use in Canada, based on results of ecotoxicological and mammalian toxicity tests as well as physical and chemical characterizations conducted by FPIInnovations. CNC is the first nanomaterial to be included in Environment Canada's Domestic Substances List and is covered by the Canadian Environmental Protection Act.

## Resource Roads and Wetlands

Scientific evidence shows that ecosystems around the world are under unprecedented pressure. Although the challenges are daunting, they also provide opportunities for the forest sector to innovate for the benefit of communities, economies and the global environment.

In the forest products industry, the construction of resource roads that pass through wetlands can create numerous environmental, ecological and operational challenges. Armed with engineering excellence in resource roads and wetland interactions, FPIInnovations is committed to promoting and supporting sustainable resource-based

industry practices and maintaining the function of wetlands and waterfowl resources in the boreal forest.

FPIInnovations' research is aimed at maintaining the biological and hydrologic function of the various types of wetlands, while providing practical cost-effective solutions for the construction of resource roads across wetlands. FPIInnovations has partnered with governments, businesses, universities and industry organizations to seek opportunities to carry out specific joint research projects, operational trials and knowledge transfer activities in support of this common objective. In November 2012, FPIInnovations

**FPIInnovations is committed to promoting and supporting sustainable resource-based industry practices and maintaining the function of wetlands and waterfowl resources in the boreal forest.**

signed a memorandum of understanding with Ducks Unlimited Canada to develop beneficial management practices for wetland road crossings to maintain natural flow when wetlands cannot be avoided. Similar partnerships have been established with Louisiana-Pacific, Weyerhaeuser, Resolute Forest Products, J.D. Irving, EACOM Timber, Spruce Products, Alberta-Pacific Forest Industries, the University of New Brunswick and Dalhousie University.

## Harvest Operations

The accumulation of residues at roadside during harvest operations is another daunting challenge. There is an opportunity to use this forest biomass to generate green energy, but often there are no locally available options for bioenergy.

Without treatment, thick mats of roadside residues can result in areas being taken out of

forest production. Provincial regulations on roadside residues management from full-tree harvesting systems aim to recover roadside area for regeneration, but caution is needed to avoid compromising stocking levels on the cutover from redistributed slash. FPIInnovations is committed to creating more sustainable solutions to minimize environmental impacts.

In 2012, FPIInnovations worked with the New Brunswick Department of Natural Resources to research the impact of imposing slash redistribution for full-tree harvesting on Crown lands when there are no options for recovering roadside debris for bioenergy. FPIInnovations has also helped Resolute Forest Products, Domtar and Tembec investigate their debris management systems and develop methods to avoid having areas taken out of forest production.

## Wildfire Operations

FPIInnovations relies on the creativity and vision of its network of scientists, researchers, and engineers to achieve its full potential for innovation. Such innovation includes forest vegetation management to protect communities from wildfire.

The general theory behind vegetation management is well established and it is supported by numerous anecdotal observations. However, few studies have provided scientific evidence and without it, wildfire management agencies are limited in their ability to justify and conduct treatments. One type of vegetation management is strand thinning,



where stems are selectively removed to increase the space between tree crowns and reduce the amount of flammable material in the canopy.

FPIInnovations' research includes conducting experimental burns to determine how stand thinning influences crown fire behaviour. In June 2012, FPIInnovations' Wildfire Operations research team conducted an experimental fire with the Government of the Northwest Territories that further confirmed the efficacy of stand thinning. The team treated (thinned) a small area within a mixed stand of jack pine and black spruce. A controlled crown fire was allowed to burn from the adjacent untreated stand into the treated area and the changes in fire behaviour were recorded. Such experiments allow the team to collect data that help agencies predict fire behaviour and determine the best methods to protect communities from wildfires.



## **SUSTAINABILITY of the FIBRE SUPPLY**

# SUSTAINABILITY of the FIBRE SUPPLY



## Sustainability of Fibre Supply

Today's trees growing in the Canadian forest are tomorrow's lumber, paper, biocomposites and engineered wood products created to provide green, solid products and buildings. Innovative processes, strategies and tools now enable the industry to selectively extract, transport and transform wood fibre via sustainable supply chains that involve multiple companies harbouring complementary expertise. Once again this year, FPInnovations has supported and advised its members and clients every step of the way.

## Informed Planning Decisions

Early on, entrepreneurs and forest producers need the most accurate information possible about their stands to make the best resource management decisions: they need reliable, accurate information at the planning stage to increase the competitiveness of their businesses and optimize the value of harvests over the short- and long-term. Innovative technologies such as

terrestrial and aerial LiDAR can generate this information, and more accurately than ever. These laser-based technologies allow for an enhanced forest inventory that collects information about stands—canopy height and closure, biomass, terrain topography, waterways, regeneration, etc.—and also about individual trees and their physical attributes: crown dimension, volume, height, diameter, species, etc.

In collaboration with the Canadian Wood Fibre Centre (CWFC), FPInnovations' approach over the last year has been to forge ahead with the development of these technologies and to study the use of resulting data on resource management decision tools designed to optimize costs and productivity of forest operations. Recent results show that enhanced forest inventory data significantly contribute toward producing operating plans that lower road construction costs, increase the productivity of harvesting machines and create overall economies within the entire forest operations value chain at a competitive cost. Feeding aerial LiDAR-acquired data into FPIInterface™ (FPInnovations' proprietary operations planning and scheduling tool) also enables members and clients to remotely determine the net value of a stand's cutblock. Terrestrial LiDAR data, on the other hand, can now be used to create 3D data sets of singular trees. Linked into Optitek (FPInnovations' log sawing simulation software), these data sets can be used to determine the potential product basket of standing trees.

## Refining Silvicultural Practices

FPIInnovations' researchers went to great lengths this year to rethink silvicultural practices in terms of regeneration strategies, planning tools and safety issues. For instance, researchers found that carefully conducted treatment of areas affected by natural disturbances allows for optimized regeneration density and a reduction in fire hazards, while increasing the safety of ground crews.

Trials were also carried out before planting to analyze various site preparation methods on regeneration performance. Three out of four prepared sites showed a reduction of 50% in estimated regeneration costs. Research also demonstrated that slash redistribution may have great impacts on harvesting practices and on site preparation quality in terms of productivity and environmental and certification issues.

Planter safety has always been an important issue for FPIInnovations. Improvements this year include better understanding the effects of slope steepness and travel speed on the risks of slipping, tripping and falling for tree planters.

## Forest Feedstocks

The use of solid biomass for energy production is rapidly growing and this trend is expected to accelerate over the next few years. In light of validation trials coordinated over the past year, FPIInnovations is able to provide members and clients interested in the emerging global bioeconomy with strategic expertise on biomass supply and manufacturing. Recent research findings from many mill visits and projects paved the way for improved biomass supply systems and feedstock quality, while mitigating technical and financial integration barriers.

Technological investigations were undertaken to integrate biomass cogeneration or pellets into existing OSB or plywood manufacturing

facilities. The *Hog Pile Management - Quick Reference Guide* was published to present factors and techniques to effectively manage comminuted forest biomass as well as prevent combustion and degradation. Other key results obtained in 2012 include in-field storage strategies to lower moisture content; a hog fuel contamination study; and studies on biomass attributes for different utilizations—size and format, moisture content, contamination, calorific value, carbohydrate content, ash content and lignin content for either combustion (scale), gasification, pyrolysis, densification or distillation.

Further key results from 2012–2013 include small-scale supply chains and bioenergy systems that have been developed for heating or cogeneration plants within six Canadian remote communities.

FPIInnovations researchers collected information about environmental issues related to biomass recovery. Various biomass harvesting practices were analyzed in terms of the impact on site nutrient status. Life cycle analysis studies on pellets for electricity generation were successfully carried out in collaboration with the Ontario Forestry Research Institute and Environment Canada.

## Into the Market

The green building movement is an increasingly important driver of material selections. Wood is rightfully perceived as a “green” material and wood fibre products, biocomposites and engineered wood products are major

contributors to the green building industry. Capitalizing on this trend, FPIInnovations is working hand in hand with the Canadian forest industry and its partners in the wood product and construction industries to promote the properties of wood and to optimize the efficiency and sustainability of the wood fibre supply chain—from forest to markets.

Hard pressed by customers and communities demanding environmentally friendly products and construction, designers, architects and engineers are turning to manufacturers for help to meet this demand as well as to comply with voluntary and regulatory programs (e.g., LEED). In addition to these programs, which are already in widespread use throughout North America, several countries have established green codes and standards for their construction industry. This year, FPIInnovations re-edited a complete guide entitled *Selling Wood Products to the Green Building Market* to help Canadian wood product manufacturers better navigate the green marketplace and understand the impact of the green building movement on their products. The *Guide* is publicly available on FPIInnovations' Advanced Building Systems webpage. This up-to-date edition reflects the many changes in green building programs and contains lists of regulatory program specifications and information on third-party certification agencies as well as green product databases. It also

provides step-by-step instructions on how to align wood products with the various green building rating programs evaluated and suggests options for how to get green products recognized in the marketplace.

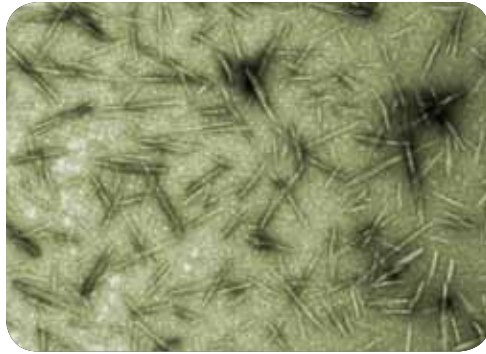




**BIOPRODUCTS**



# BIOPRODUCTS



## Bioproducts: Branching Out Into the Global Bioeconomy

The power to revitalize the Canadian forest industry—that’s what is expected from the intense research efforts at FPInnovations to create new and specialized fibre-based biomaterials and bioproducts. This year, research teams working in close collaboration with their university and industry partners have firmly maintained their commitment to support members and clients in the development of new value-added products that capitalize on emerging markets for natural, renewable products and reinforcing agents. One central challenge consists of innovating, while working on integrating the production of these bioproducts into the existing forest industry value chain. Great opportunities are opening up in these evolving markets, especially in a variety of products such as pulp, paper and plastics; composites; cosmetics; adhesives; textiles; food; inks; pharmaceuticals and coatings.

## Cellulose Nanocrystals

Canada stands at the forefront of a global race to develop the next generation of wood fibre-based materials and to become the world’s clean bioenergy and bioproduct powerhouse. Very significant developments were achieved again this year in the field of cellulose nanocrystals (CNC) research. This cellulose-based nanostructure is known for being abundant, renewable, recyclable and environmentally harmless. The ability to improve the strength, durability and toughness of products as well as to reduce damage caused by wear, abrasion and light has been demonstrated.

The research team from the CelluForce Inc. industrial pilot plant managed to successfully produce CNC of equivalent quality to that obtained in the FPInnovations CNC laboratory pilot plant in Pointe-Claire, Québec. The research team also reached major production milestones and are continuing development work to ensure the promise of this bioproduct will become reality.

From a long list of Patents either in the preparation or submission stage, FPInnovations has received a positive answer from one Patent application concerning CNC’s highly adjustable iridescent properties, bringing the cellulose-based nanomaterial one step closer to becoming a major contributor to the green economy in numerous industrial sectors such as cosmetics, security papers and pigments as well as switchable optical filters and barriers.

## Fibre Biocomposites

Destined to maximize the value of the product mix generated from forest resources, wood fibre biocomposites are designed for manufacturing green construction materials, geotextiles and other agricultural products; as well as lightweight automobile components and other composite materials in acoustic or furniture products.

Focusing more closely on market needs, FPIInnovations developed a Patent-pending process to manufacture low-density, foamed composites from pulp. This material could be used as rigid insulation to meet the new energy-efficiency requirements for housing. It could also potentially be used in packaging applications.

FPIInnovations has also developed a non-woven process and products using various wood fibre and binder systems with various process platforms, including resin impregnation—a process that eliminates or reduces the internal porosity of materials by saturating internal voids with liquid resins. Of increasing interest within the building industry because of their potentially high thermal resistance and high sound insulation properties, non-woven biocomposites may also be used in manufacturing a wide range of interior components in automotive and other transportation sectors.

## Natural Extracts

The research field of natural extracts emerged this year as an interesting opportunity for the forest sector to create high value-added products from low-value material. A wide range of high-value products can be extracted from forest biomass to produce specialty chemicals before the biomass is used to generate steam and/or electricity. Natural extracts may be a good source of renewable raw material for manufacturing adhesives, specialty resins, inks and coatings, wood preservatives and other industrial products. Other market opportunities exist in cosmetics (anti-aging,

hair and acne treatment, anti-wrinkle, UV protection), food supplements (colouring agents, aromas, antioxidants) and pharmaceutical products (anti-cancer, anti-inflammatory, anti-viral). FPIInnovations has showcased the possibility of setting up a technological platform designed to assist members and clients—from the identification, characterization and extraction of high-potential extracts of forest biomass, to their evaluation and commercialization.

## Lignin: From Waste By-product to Super-bioproduct

Strengthening its leadership position in the development of new market opportunities for the forest sector, FPIInnovations' lignin pilot plant located in Thunder Bay, Ontario has now been successfully running an experimental 100 kg/day production for two years. Lignin is a complex wood fibre-derived molecule that is extracted from black liquor that holds the potential for replacing many chemicals currently derived from petroleum-based sources. Initial characterization and experimental production trials were financially supported by Natural Resources Canada's Transformative Technologies Pilot-Scale Demonstration Program. Quantities of high-quality lignin are already being tested in pre-commercial trials for adhesive applications at client facilities.

A Patent application concerning an innovative lignin extraction process has been developed by FPIInnovations' researchers. The resulting one-of-a-kind proprietary

“LignoForce System” involves a black liquor pre-treatment oxidation process that significantly reduces the plant’s consumption of chemical products—therefore reducing costs while enhancing end-product quality. Presented at international conferences, the process has taken the pulp and paper world by surprise and has received much praise from world-renowned lignin researchers and leaders.

The Canadian forest industry will greatly benefit from this technology as it can be integrated into existing machinery at pulp and paper facilities with a relatively small investment and enables the production of 50 metric tons per day of a profitable high-quality product, further consolidating the forest sector’s revenue diversification strategy.

for bituminous coal in higher value applications such as metallurgy and soil rehabilitation. The research will also focus on the conversion of biochar into activated carbon for gas and water treatment. World demand for activated carbon is forecast to increase through 2014 to 1.7 million metric tons. The U.S. represents the largest market in the world for activated carbon, and demand is expected to reach almost 700,000 metric tons by 2014.

## **Biochar: Top-end Value-added Biomass Product**

In March 2013, FPInnovations signed a three-year partnership with Resolute Forest Products, Airex, CTRI, CRIBIQ and NSERC to improve the production of biochar: a high carbon-content material created through the high-speed torrefaction of wood biomass. The high calorific value of biochar also makes it an interesting alternative to heavy fuel and coal. Scenarios of full-scale industrial biochar production in the province of Québec estimate that replacing heavy fuel and coal could reduce the province’s greenhouse gas emissions by approximately nine million metric tons. Biochar may also be used as a substitute



## BIOENERGY and BIOMASS

# BIOENERGY and BIOMASS



## Creating a Canadian Advantage in Bioenergy and Biomass

Canada’s forest industry is in the process of transforming itself with a move towards bioenergy, biochemicals and bioproducts, and FPIInnovations’ research is leading to potential eco-efficient solutions that could play a significant role in an economy increasingly concerned with sustainable development. From bioplastics to inks, textiles and cosmetics, FPIInnovations is spearheading the development of innovative applications and products based on next-generation pulps, papers and bioproducts.

## New Guidebook for Managing Biomass Storage

The forest industry is well positioned within an emerging bioeconomy and is already a leader in reducing carbon emissions and producing green power. FPIInnovations develops best management practices and contributes toward making forest biomass a viable fuel for the future.

As the Canadian bioeconomy grows and energy prices continue their upward trend, demand for renewable energy has increased. And with it, more demand for biomass and better biomass storage practices.

In 2012, FPIInnovations produced the *Hog Pile Management – Quick Reference Guide*, a summary of published literature focusing on characteristics and management of comminuted (hogged) forest residues. With the rise in hog fuel use, piles have become larger, with more contamination and more reported fires. The *Guide*—designed as a flip-book-style field manual—addresses these issues. The focus is on managing hog fuel piles on an industrial scale. Included are an outline of the factors leading to their degradation or combustion, an overview of the mechanism of spontaneous combustion in such piles and tips on emergency response in case of hog pile fire. The *Guide* also highlights pile management techniques—for instance, pile size, temperature monitoring, moisture management and storage times.

## Supporting the Bioeconomy in BC

FPIInnovations has been very active in British Columbia conducting analyses in Prince George, Williams Lake, Quesnel, Kwadacha, the Lakes Timber Supply Area and parts of Vancouver Island to assist members with evaluation and availability of forest biomass



from various sources such as harvest residues, burnt and insect-killed stems, among others.

For this endeavour, FPInnovations uses its own technology—the Biomass Opportunity and Supply (BiOS) module in FPIInterface™—in numerous biomass assessments and bio-pathways studies. BiOS is a tool for assessing the usage of forest-origin biomass from a provided timber harvest area, giving the Canadian forest industry a new comprehensive tool for biomass use, operational planning, budgeting and net value analysis.

## Improving Recovery Boiler Performance at Pulp Facilities

With the current spotlight on being green, Canadian pulp mills are turning their attention to energy production.

FPInnovations continues to develop new

products and technologies to support the industry's adaptation and deployment of these emerging technologies and processes, particularly in the area of recovery boiler performance.

The performance of recovery boilers declines as they become plugged. FPInnovations and Eco-Tec Inc. have developed a new system called Precipitator Dust Purification (PDP) to avoid plugging and corrosion in recovery boilers by removing excess chloride from electrostatic precipitator

dust. The PDP system, which cuts down on boiler plugging by controlling chloride in kraft pulping liquors, is based on a simple

process that allows for the separation of dissolved salts by contacting with a resin, similar to the ion exchange process. This system leads to reduced downtime for recovery boiler washing, increased steam and power production and reduced operating costs (e.g., reduced chemical make-up requirements). The system is available from NORAM Engineering and Constructors of Vancouver, BC.

## The Big BEN

Late last year, FPInnovations joined eight other industry groups to form the new Bioeconomy Network (BEN). FPInnovations and its partners in the network share a strong belief that Canada can use its abundant renewable resources of forest and agricultural residues in innovative ways to feed the bioeconomy.

BEN has a diverse membership across different sectors, including the Forest Products Association of Canada, the Automotive Parts Manufacturers' Association, BIOTEC Canada, the Canadian Bioenergy Association, the Canadian Renewable Fuels Association, the Chemistry Industry Association of Canada, CropLife Canada and Bioindustrial Innovation Canada/Sustainable Chemistry Alliance.

BEN aims to turn Canada into a true powerhouse in the global bioeconomy through generating green and innovative products from our natural resource wealth.

**Canadian pulp mills are turning their attention to energy production. FPInnovations continues to develop new products and technologies to support the industry's adaptation and deployment of these emerging technologies and processes, particularly in the area of recovery boiler performance.**



## Energizing Their Joint Efforts

FPIInnovations has signed a memorandum of understanding with Natural Resources Canada's CanmetENERGY to formalize our joint efforts to identify novel products and technologies from bioeconomy-based forest operations.

Researchers from both organizations will work together to exchange scientific and technical information and collaborate on projects to deliver innovative solutions in the areas of energy efficiency, process integration, energy cogeneration and biorefining, as well as the transformation of forestry biomass to bioenergy and high-value bioproducts.



**COLLABORATION**

# COLLABORATION



## Partnerships to Promote and Support the Forest Industry

FPIInnovations believes that strong partnerships and strategic research alliances are necessary to achieve real solutions for the forest industry. FPIInnovations is therefore engaged in significant collaborations with universities, governments and industry stakeholders, and provides a bridge to transfer technology from the laboratory to practice.

Perhaps one of the most unique examples in Canada of an effective strategic partnership is FPIInnovations itself. It was created in 2007 by merging three independent research organizations into one, and then adding a fourth – Natural Resources Canada’s (NRCan’s) Canadian Wood Fibre Centre. The significant intellectual resources of all of the organizations have been aligned along the forest value chain to provide research services and products at a national scale that are efficient, integrated and comprehensive.

## Power in Numbers

In 2008, the Natural Sciences and Engineering Research Council of Canada (NSERC), FPIInnovations and NRCan partnered to create the NSERC Forest Sector R&D Initiative—a \$34 million, five-year initiative to identify commercially relevant research programs to create new market opportunities for the Canadian forest sector. Within the initiative, there are seven NSERC Strategic Networks and one Business-led Centre of Excellence. The Networks, comprised of 27 universities, over 120 professors and some 400 students and post-doctoral fellows, address key forest research areas within FPIInnovations’ Innovation Program, and are aligned with the National Forest Sector Transformation Strategy. Further synergy was developed in 2011 when the Networks aligned under Forest Innovation by Research and Education (FIBRE)—with the objective of improving the coordination of research activities and aligning them with sector innovation priorities.

FPIInnovations has been a strong supporter of FIBRE from the outset because we believe that universities are playing a key role within the Canadian forest sector innovation system. Ground-breaking research is helping transform the forest products sector into a dynamic, future-oriented industry and partnerships such as FIBRE are key components of the innovation system in helping Canadian forest companies thrive through the development and deployment of innovation towards a sustainable future.

## Involving First Nations Communities

FPIInnovations has collaborated with 51 First Nations communities to improve the viability and technical capacity of the forest industry in their communities. The work focused on five areas: forest operations and transportation, mill equipment selection and layout, market development, product development and design, and business development.

So far, 20 businesses have been created or expanded as a result of the program, slightly more than the targeted 15. Over \$1.3 million in new capital investment in manufacturing capacity has been identified, well beyond the goal of \$350,000, and at least 40 jobs have been created, exceeding the objective of 25.

## Fire Research Collaboration

FPIInnovations is collaborating internationally to facilitate the use of cross-laminated timber (CLT), a relatively new building system. CLT is a wood-based solution that complements the existing light-frame and heavy timber options, and is a cost-competitive candidate for some applications that currently use concrete, masonry and steel. CLT panels have the potential to provide good fire resistance, often comparable to typical massive assemblies of non-combustible construction. The recent publication of a U.S. edition of the *CLT Handbook* is discussed in the Market and Market Access article.

To facilitate the acceptance of proposed code provisions for the fire-resistant design of CLT panels, FPIInnovations' Advanced Building Systems group launched a research project in collaboration with the National

Research Council of Canada (NRC). The project developed and validated a generic fire resistance calculation procedure for CLT assemblies that will foster the design of fire-safe CLT buildings in Canada and the U.S. In early 2012, the American Wood Council (AWC) and APA submitted a code change proposal to include CLT in the description of Type IV construction (heavy timber) for the 2015 edition of the International Building Code. FPIInnovations' fire research scientists completed a thorough test report in support of the code change proposal, which was approved in October 2012. CLT has also been recognized as an alternative to a two-hour, fire-rated, non-combustible exterior wall.

**FPIInnovations is collaborating internationally to facilitate the use of cross-laminated timber (CLT), a relatively new building system.**

In addition, fire researchers at the NRC are progressing on a comprehensive study to develop fire-safety performance data to facilitate the use of wood-based structural products in mid-rise buildings. The project is a collaborative study, with research being conducted by the NRC, Canadian Wood Council and FPIInnovations, with support from NRCan and the provinces of Ontario, British Columbia and Québec. The results of this large-scale fire test program will help support current discussions at the Standing Committee levels for allowing mid-rise combustible construction in the 2015 National Building Code of Canada.

## Tall Wood Building Initiative

Recent efforts to relax the height and area limits for wood construction have

amplified interest within the design and construction community towards taller and larger wood buildings. Some early adopters see great potential for using wood systems in high-rises, and this has triggered an initiative from NRCan for tall wood building demonstration projects. This initiative, which will enhance Canada's position as a global leader in tall and large wood building construction, by showcasing the application and performance of advanced wood technologies, is overseen by a steering committee comprising representatives from NRCan, Canadian Wood Council (CWC), Forestry Innovation Investment (FII), NRC, Binational Softwood Lumber Council (BSLC) and FPInnovations.

The design teams of tall wood buildings will have very specific technical challenges. To fill that need, as part of the above tall wood building initiative, FPInnovations is undertaking a project to develop a *Technical Guide for the Design and Construction of Tall Wood Buildings in Canada*, in cooperation with CWC, NRC, several universities and the design and construction communities, so that these challenges can be systematically addressed in demonstration projects.

## Progress in Hardwood Initiative

FPInnovations' Hardwood Research Initiative Program was developed to foster the competitiveness of the hardwood

sector. With financial support from NRCan; the governments of Ontario, Québec, New Brunswick and Nova Scotia; and with industry and research partners, FPInnovations has designed short- and medium-term solutions for transforming this sector. Eighteen projects covering areas ranging from harvesting, to second- and third-level hardwood forest transformation have been developed. Through this partnership, several technology transfer initiatives were carried out in 2012, including conferences, workshops, field trips and numerous reports and articles. The projects were led by researchers from FPInnovations and the Canadian Wood Fibre Centre.

**FPInnovations has designed short- and medium-term solutions for transforming the hardwood sector.**

## Changing the Way Pulp Manufacturers Do Business

In the area of pulp production, the current marketplace is lacking instrumentation that can provide rapid measurement of the physical and mechanical properties of pulp. To help member companies, FPInnovations signed a strategic research agreement with FITNIR Analyzers Inc. to jointly develop new measurement technologies focusing on the advantages of spectroscopy solutions.

The initial joint development projects will be based on the success of a bench-top near-infrared device for the measurement of pulp properties, including oven-dry content and physical and mechanical properties of High Yield Pulp (HYP). With the capability of providing critical HYP properties within minutes, pulp mills will have the ability to adjust the process in real time and to segregate their product by quality—a game changer for pulp producers in a competitive market. This development will help focus improvement efforts on quality assurance and customer satisfaction, while enabling better

inventory management and timely process adjustments to reduce costs.

The partnership will enable technology transfer to FPInnovations' member companies and eventual commercialization of innovative products, and will lead to the successful commercialization of ground-breaking instrumentation for pulp producers.





# Our Members and Partners as at March 31, 2013

## A

Acadian Timber / AT Limited Partnership

Acier Ecan (Division of Acier AGF)

Adfast Corporation (Adchem Adhesives)

AEF Global

[Agropur](#)

Ainsworth Lumber Co.

Airex Industries

AkzoNobel Bois Peintures

[Alberta Fire Commissioner](#)

Alberta Newsprint Company

Alberta-Pacific Forest Industries

Alpa Lumber

Altec Integrated Solutions

Arch Wood Protection Canada  
(Division of Lonza)

Architectures Toubois

Armoires Distinction

Art Massif Structure de bois

Artopex

Autolog

AV Cell

AV Nackawic

## B

Barrett Enterprises

BC Hydro

[BC Transmission Corporation](#)

Bégin & Bégin

Bherco

[Big Freight Systems](#)

[Bison Transport](#)

Boa-Franc

Bois Ditton

Bois Expansion

Bois Franc Mont-Royal

Boisaco

Boise Cascade AllJoist

Boucher Bros. Lumber

BP Building Products of Canada

Brisco Manufacturing

Brockport Home Systems

Buckman Canada

## C

Cabico

[Canadian National Transportation](#)

[Canadian Tire Corporation](#)

Canfor Corporation

Canoe Forest Products

Cariboo Pulp & Paper Company

[Cascades Transport](#)

[C.A.T.](#)

[Centre de Formation du Transport routier](#)

[CGER](#)

Chantiers Chibougamau

[CN Rail](#)

CNC Automation

[Conair Group](#)

Conférence régionale des Élus de la Côte-Nord

Conférence régionale des Élus de la Gaspésie et  
des Îles-de-la-Madeleine (CREGIM)

Conférence régionale des Élus du Bas-Saint-  
Laurent

Conifex Timber

Coopérative Forestière de Girardville

Coopérative Forestière de la Matapédia

Coopérative Forestière des  
Hautes-Laurentides

[Coulson Air Crane](#)

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Industry members

[Wildfire Operations \(WFORG\) program](#)

[Performance Innovation Transport \(PIT\) program](#)



# Our Members and Partners as at March 31, 2013

## D

Damabois  
Dava  
Delco Forest Products  
Delmhorst Instrument Co.  
Diacon Technologies  
Distribution R. Désilets  
DK-Spec  
Domtar Corporation  
Doucet Machineries

## E

EACOM Timber Corporation  
East Fraser Fiber Co.  
Ébénisterie Richard & Levesque  
[Eco Fire Solutions](#)  
Éloi Moisan  
Équipements Comact  
Escaliers Gilles Grenier

## F

Feutre National Felt  
Finitec Canada  
Florcan

## G

[G3 Transport](#)  
Genics  
Gestion Forestière Lacroix  
Gestion Rémabec  
Giguère & Morin  
[Government of Northwest Territories](#)  
[Government of Saskatchewan](#)  
[Government of Yukon](#)

[Grand Island Express](#)

[Groupe Boutin](#)

Groupe Crete (Division of St-Faustin)

Groupe Forestra

Groupe G.D.S.

Groupe Lebel (2004)

[Groupe Morneau](#)

Groupe NBG

Groupe Savoie

[Groupe Trans-West](#)

[Groupe TYT](#)

## H

Hultdins  
Hydro-Québec

## I

[ICL Performance Products](#)  
Industries Lacwood  
Interbois  
International Forest Products  
Island Timberlands

## J

J.D. Irving  
J.M. Champeau  
J.O. Noël Houle et Fils  
Janssen PMP (Division of Janssen Pharmaceutica NV)  
Jean Riopel (Division of Groupe Crête)

## K

Kootenay Innovative Wood  
Kop-Coat  
Kruger



# Our Members and Partners as at March 31, 2013

## L

L&M Lumber (Sinclar Group)  
Laboratoire Primattech  
Landes Forestières Uapats  
Laurentide Industriel (Division of Société Laurentide)  
Lauzon Industries  
Les Bois de Plancher P.G.  
Les Industries A.P.  
Les Industries JSP  
Les Machineries AutomaTech  
Les Planchers Mercier  
Les Portes Baillargeon  
Les Systèmes HMS Canada  
Liebherr Canada  
Lignol Innovations  
Louisiana-Pacific Canada  
LP Engineered Wood Products  
LVL Global

## M

M.C. forêt  
Machinerie Lico  
Maibec  
Manning Diversified Forest Products  
Marcel Lauzon  
Masonite International Corporation  
Matériaux Blanchet  
Matériaux Spécialisés de Louiseville  
McRae Lumber Company  
Meadow Lake OSB  
Meubles Canadel  
Microtec Industries North American  
Mill & Timber Products

Millar Western Forest Products

Ministère des transports du Québec

Ministry of Environment and Sustainable  
Resource Development (Alberta)

Moncrief Renewables

Mouleurs distinction Outaouais

## N

National Bank of Canada

Natural Resources Canada

NB Power

NEFAB

Northland Forest Products

## O

Olofsfors

Outils Gladu

## P

Pacific BioEnergy Corporation

Parquets Alexandra

Peinture Can-Lak

Planchers de bois-francs Wickham

Planchers des Appalaches

Port Hawkesbury Paper

Porter Engineering

Portes Lemieux

Poutrelles Internationales

PPG Industries

Praxair

Preverco

Produits Forestiers Arbec

Produits Forestiers Lamco

Produits Forestiers Temrex



# Our Members and Partners as at March 31, 2013

## R

Réné St-Cyr 1996  
Resisto Industriel (Division of Soprema)  
Resolute Forest Products  
Richmond Plywood Corporation  
Rio Tinto Minerals (U.S. Borax)  
Rocky Wood Preservers  
Roland Boulanger et Cie

## S

Sawquip International  
Scierie Duhamel  
Scierie St-Fabien  
Scieries Chaleur  
SCM Group Canada  
SCS Forest Products  
Séchoir MEC  
Seven Islands Land Company  
Silvana Import Trading  
Simard cuisine et salle de bains  
Simon Lussier  
Sinclar Group Forest Products  
[SLH Transport](#)  
[Sobeys](#)  
SOCAM  
[Société des alcools du Québec](#)  
Solive Ajourée 2000  
Spray Lake Sawmills (1980)  
Stadacona (Division of White Birch Paper)  
Stella-Jones Canada  
Structurlam Products  
Stuwix Resources Joint Venture  
Sundance Forest Industries  
Synergy Pacific Engineered Timber

## T

Tecolam  
Tembec  
Tembec Resin Group  
The Teal-Jones Group  
[Thermo Technologies, LLC Thermo-Gel](#)  
ThermoStructure  
Timber Specialties  
(Division of Osmose Holdings)  
TimberWest Forest Corp.  
Tire Pressure Control International  
Tolko Industries  
[Transport Bernières](#)  
[Transport Bourassa](#)  
[Transport Canada](#)  
[Transport Hervé Lemieux](#)  
[Transport Robert](#)  
[Transport YN Gonthier](#)

## U

Uniboard Canada  
University of Northern British Columbia  
USNR

## V

VAB Solutions  
Valspar  
Vanderwell Contractors (1971)  
Vanico-Maronyx  
Vattenfall AB - BD Renewables  
Vexco  
Viance  
[Ville d'Alma](#)  
[Ville de Beaconsfield](#)  
[Ville de Boucherville](#)



# Our Members and Partners as at March 31, 2013

- Ville de Côte St-Luc
- Ville de Dollard-des-Ormeaux
- Ville de Lévis
- Ville de Montréal
- Ville de Pierrefonds
- Ville de Pointe-Claire
- Ville de Repentigny
- Ville de Saguenay
- Ville de Saint-Jean-sur-Richelieu
- Ville de Shawinigan
- Ville de Sherbrooke
- Ville de Victoriaville

## W

- Wagner Electronics
- West Fraser Timber
- Western Archrib
- Western Forest Products
- Westmill Industries
- Weyerhaeuser Company
- Whitecourt Transport
- Whitefeather Forest Management
- WoodPlus Coatings

## Y

- Yaorun Wood

## Z

- Zavisha Sawmills
- Zellstoff Celgar

## GOVERNMENT PARTNERS

### FEDERAL

- Government of Canada
  - Natural Resources Canada, Canadian Forest Service

### PROVINCES AND TERRITORIES

- Government of Alberta
- Government of British Columbia
- Government of New Brunswick
- Government of Newfoundland and Labrador
- Government of Northwest Territories
- Government of Nova Scotia
- Government of Ontario
- Government of Québec
- Government of Saskatchewan
- Government of Yukon



# Our Governance as at March 31, 2013

## OFFICERS OF THE CORPORATION

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Chairman of the Board  
Al Ward

Vice-Chairman of the Board  
Mark Feldinger

President and Chief Executive Officer  
Pierre Lapointe

Chief Financial Officer  
Yves Nadon

Corporate Secretary  
Norine Young

## BOARD OF DIRECTORS

---

### CHAIRMAN

Al Ward  
Alberta-Pacific Forest Industries

### VICE-CHAIRMAN

Mark Feldinger  
Canfor

Daniel Archambault  
Kruger

Don Banks  
Tolko Industries

Alain Boivin  
Resolute Forest Products

Kent Campbell  
Ministry of Energy and Resources  
Government of Saskatchewan

Catherine Cobden  
Forest Products Association of Canada

Doug Konkin  
Ministry of Forests, Lands and Natural  
Resource Operations  
Government of British Columbia

Pierre Lapointe  
FPInnovations

Jim Lopez  
Tembec

Bruce Mayer  
Ministry of Environment and Sustainable  
Resource Development  
Government of Alberta

Charles Tardif  
Maibec

Bill Thornton  
Ministry of Natural Resources  
Government of Ontario

## OBSERVER

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Tom Rosser  
Canadian Forest Service  
Natural Resources Canada

## BOARD MEMBERS WHO RESIGNED OR RETIRED IN 2012–2013

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John D. Williams  
Vice-Chairman of the Board  
Domtar

Pierre-Gabriel Côté  
FibreK

Yvon Pelletier  
Tembec

Richard Savard  
Ministry of Natural Resources  
Government of Québec

Ted Seraphim  
West Fraser Timber

## OBSERVER

Ailish Campbell  
Industries Branch  
Industry Canada

FPInnovations wishes to thank these  
former Board members for their  
valuable contribution to the  
Corporation.





# Our Advisory Committees as at March 31, 2013

## NATIONAL RESEARCH ADVISORY COMMITTEE (NRAC)

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The role of the National Research Advisory Committee (NRAC) is to support research and long-term strategic development. This committee also ensures that all research aligns with the National Forest Sector Transformation Strategy (NFSTS).

NRAC members meet twice a year. The chair is appointed from the members of the FPInnovations' Board of Directors. The other NRAC members are drawn from FPInnovations' partner organizations and academic circles.

### CHAIRMAN

VACANT

Don Banks  
Tolko Industries

Blake Brunsdon  
J.D. Irving

David Chamberlain  
Kruger

Catherine Cobden  
Forest Products Association of Canada

Joe Costantino  
Millar Western Industries

André Denis  
Ministry of Natural Resources  
Government of Québec

Fred Dzida  
Weyerhaeuser

John Innes  
University of British Columbia

Susanna Laaksonen-Craig  
Ministry of Forests, Lands and Natural Resource  
Operations  
Government of British Columbia

Bruno Marcoccia  
Domtar

Glenn Mason  
Canadian Forest Service  
Natural Resources Canada

Brian Merwin  
Mercer International

Lorne Morrow  
Center for Research and Innovation in the  
Bio-Economy (CRIBE)

Daryl Nichol  
Alberta-Pacific Forest Industries

Dan Wilkinson  
Ministry of Environment and Sustainable  
Resource Development  
Government of Alberta



# Our Advisory Committees as at March 31, 2013

## NON-VOTING MEMBERS

Lyle Biglow  
Tembec

Kevin Blau  
Tolko Industries

Alain Bossé  
Groupe Savoie

Geoff Clarke  
Alberta-Pacific Forest Industries

Alain Cloutier (NSERC Network)  
Université Laval

Lynn Embury-Williams (NSERC Network)

Martin Fairbank (NSERC Network)  
Resolute Forest Products

Jacques Girard  
Produits Forestiers Lamco

Eric Heine  
Mercer International

Janusz Lusztyk (NSERC Network)  
NRC Institute for Chemical Process &  
Environmental Technology

Dave McDonald (NSERC Network)

Ryan Oliver  
Tolko Industries

Jack Saddler (NSERC Network)  
University of British Columbia

Brian St. Germain  
Louisiana-Pacific Corporation

Balázs Tolnai  
Kruger

Theo G.M. van de Ven  
McGill University



# Our Advisory Committees as at March 31, 2013

## PROGRAM ADVISORY COMMITTEES (PACS)

Program Advisory Committees (PACs) provide guidance to ensure the various FPIInnovations research programs are relevant to the industry's greatest needs. They also ensure that research activities are geared towards operational improvements, best practices and technology transfer. PACs evaluate and approve research project proposals; they also evaluate the performance of projects that have been set in motion. They report to the NRAC on the progress and performance of the various research programs.

The members of each Program Advisory Committee (PAC) are representatives of FPIInnovations' member organizations. The National Research Advisory Committee (NRAC) appoints a PAC chair from among the committee members. PACs meet twice a year.

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