



Renewed Forest Bioeconomy Framework





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EXECUTIVE SUMMARY

In 2017, the Canadian Council of Forest Ministers (CCFM) endorsed *A Forest Bioeconomy Framework for Canada*. The Framework's goal is to advance the next generation of forest sector transformation and diversification efforts in Canada by responding to the critical need for improved policy coherence. It represents an opportunity to better collaborate and mobilize initiatives, identify and address knowledge gaps, and measure progress.

At the November 2021 CCFM Meeting, Ministers recognized that a renewal of the Framework was needed. Ministers agreed that while the 2017 Framework was still relevant, it needed to be updated to accelerate Canada's forest bioeconomy and maximize the forest sector contribution to achieving net-zero emissions by 2050.

The Renewed Forest Bioeconomy Framework focuses directly on addressing the continuing challenges the forest sector faces to realize the potential of the forest bioeconomy in Canada. To get us there, the CCFM identified high priority challenges that are relevant to jurisdictions across the country and a corresponding set of responsive actions for jurisdictions to implement as appropriate:

- **CHALLENGE:** Limited uptake of bioeconomy opportunities among Indigenous communities.
 - **Action:** Jurisdictions could use the Renewed Framework as an opportunity to pursue dialogue with Indigenous communities to accelerate an inclusive forest bioeconomy as appropriate within each jurisdiction.
- **CHALLENGE:** Access to a consistent, predictable, and competitively priced fibre supply for makers of bioproducts.
 - **Action:** Build on existing efforts to create regional biomass availability maps and carbon modeling to enable collaboration, increase utilization and manage costs.
- **Challenge:** Attracting investment for an industry – the forest bioeconomy – whose supply chains are not well known or understood.
 - **Action:** Expand efforts to encourage collaboration among all players in the supply chain to spread risk and share expertise and market access.
 - **Action:** Work with standard development organizations, certification bodies, industry associations and other bioeconomy stakeholders to continue the development of regional risk-rating and supply certification programs that enable communities to leverage local biomass assets to attract new bio-based manufacturing plants and create jobs.
- **CHALLENGE:** Market uncertainty created by the absence of definitions, standards, and certifications for bioproducts, including their climate performance (and that of the forest sector more broadly) both nationally and globally.

- **Action:** Support the development of voluntary product standards with standard development organizations and industry associations for biomass and bioproducts and their environmental performance.
- **Action:** Work with standard development organizations and bioeconomy stakeholders to develop international definitions and standards for bioproducts, biomass, and environmental performance.
- **CHALLENGE:** The environmental reputation of the forest sector and communicating the benefits of the forest bioeconomy.
 - **Action:** Continue to support scientific and economic analysis and demonstration projects that seek to validate the range of expected economic, social, and environmental benefits offered by forest bioeconomy initiatives by subsector and by province and territory.
- **CHALLENGE:** Access to focused funding for demonstration projects to scale up full supply chain projects.
 - **Action:** Continue to coordinate support for demonstrations by all orders of government.
 - **Action:** Continue to support government procurement of bioproducts by all orders of government.
- **CHALLENGE:** Ensuring regulatory and policy alignment and complementarity across Canadian jurisdictions and with global regulatory and policy leaders.
 - **Action:** Support improved communication and seek complementarity across support programs at all levels of government, respecting the jurisdiction of each level of government, and ensure that bioeconomy companies can access this support.
 - **Action:** Work through federal, provincial, and territorial tables to ensure coordination across Canada of policy and program supports for the forest bioeconomy at all levels of government.

Coherent and collaborative efforts to address these overarching challenges and working toward the implementation actions outlined below will contribute directly to the 2017 Forest Bioeconomy Framework's vision for Canada. It will also build upon work undertaken in the five years since the Framework was developed.



BUILDING ON A STRONG FOUNDATION

In 2015, the CCFM released the *Kenora Declaration on Forest Innovation*, which committed to advancing innovation by collaboration, engagement, and mobilization. In 2016, the CCFM released the *Innovation Action Plan 2016–2020*, which led to the development of *A Forest Bioeconomy Framework for Canada* (the Framework), endorsed by CCFM Ministers in 2017.

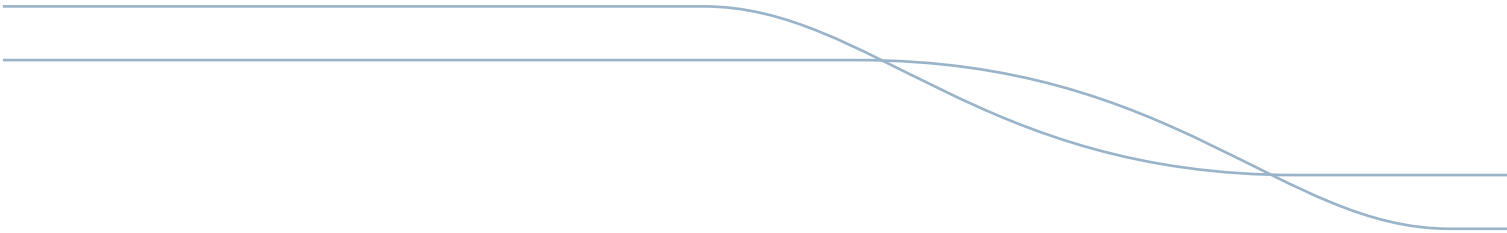
The Framework's aim is to advance the next generation of forest sector transformation and diversification efforts in Canada by responding to the critical need for improved policy coherence. It also represents an opportunity to better collaborate and mobilize initiatives, identify and address knowledge gaps, and measure progress. The Framework affirms that the CCFM is taking action to stimulate the forest bioeconomy as part of a monumental Canadian effort to shift our society toward a low-carbon, sustainable, and innovation-based economy.

Since its launch in 2017, federal, provincial, and territorial governments have taken tangible actions to implement the Framework. In Fall 2020, the CCFM Innovation Committee provided a report to Ministers capturing the achievements and highlighting opportunities for further collaboration between governments to support forest bioeconomy innovation. It recognized that all jurisdictions have a role to play in advancing the forest bioeconomy, from improving access to harvested material to attracting investment.

Given recent external factors such as the COVID-19 pandemic, increased intensity of wildland fires and impacts of climate change, at the November 2021 CCFM Meeting, Ministers recognized that a renewal of the Framework was needed. It was agreed that while the 2017 Framework was still relevant, it needed to be updated to accelerate Canada's bioeconomy and maximize the forest sector's contribution to achieving net-zero emissions by 2050.



**A RENEWED FOREST
BIOECONOMY FRAMEWORK**

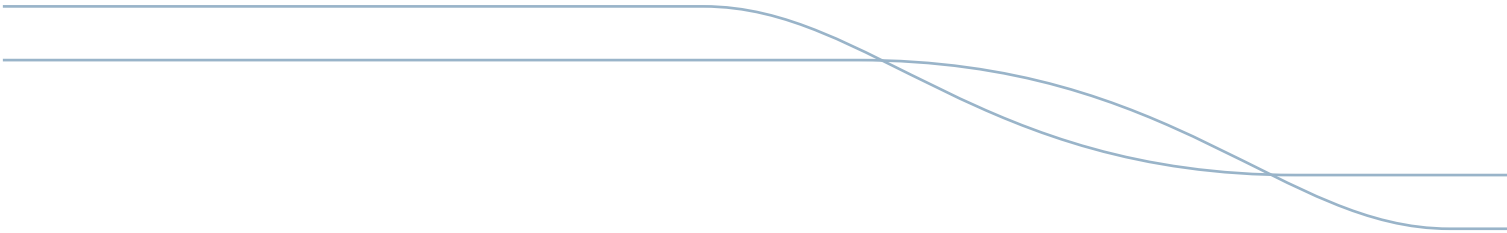


At the November 2021 CCFM Meeting, Ministers tasked the CCFM with renewing the Framework. They underlined that the renewal must **address what conditions need to be in place to accelerate the development of the forest bioeconomy in Canada**. Ministers asked the CCFM to identify concrete actions that could be taken to advance the forest bioeconomy and provided further direction on specific areas where efforts to accelerate the bioeconomy should focus, including:

- Supporting opportunities to accelerate the bioeconomy through high impact projects in key areas, such as low carbon building materials and aviation fuel;
- Supporting opportunities to utilize more fibre from harvested trees and increase value per cubic metre by moving up the value chain with bioplastics, biochemicals, and biomaterials;
- Working across sectors to promote the use of forest biomass, processing residuals and intermediary bioproducts as feedstocks for other industries;
- Ensuring that Canada has a strong environmental reputation to enable the bioeconomy; and
- Taking concrete actions to support the bioeconomy in the near term, such as through demonstration projects that will foster investment in new technologies by existing mills as well as encouraging new market entrants over the medium to long term.



**THE POTENTIAL OF CANADA'S
FOREST BIOECONOMY**



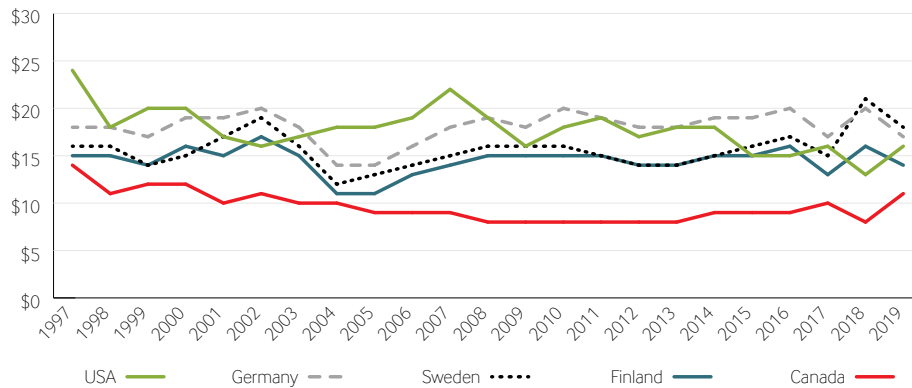
Global efforts to decrease emissions, remove fossil carbon from products, and improve the circularity of supply chains all create opportunity to drive growth in the bioeconomy. The World Business Council for Sustainable Development estimated that circular bioeconomy based economic activity could be a USD\$7.7T global market in 2030. The Boston Consulting Group estimated the Canadian opportunity at CAD\$150–240B alone. Sectors from energy, to construction, to cosmetics, to motor vehicles all stand to benefit from the growth of the bioeconomy. More importantly, sustainably produced Canadian bioproducts could address key national and global priorities, including climate change, sustainable resource development, land use change, and biodiversity loss.

Canada’s 347 million hectares of forest make up 9% of the world’s forests. Our forest sector is the second largest exporter of forest products in the world. The bioeconomy as a whole is important to Canada, comprising roughly 4% of Canada’s GDP in 2020 (BioNB and Bioindustrial Innovation Canada). The sector has kept pace with GDP growth over the last decade, but bioeconomies in other countries have grown significantly through concerted investments all along bioeconomy value chains and extensive collaboration efforts that included government, investors, industry, innovators, and certification bodies. In Sweden, for example, the bioeconomy as a whole is roughly 10% of GDP, 13% of goods exports, and 9% national employment. In comparison, it is only 4% of GDP, 7% of goods exports, and 5% of national employment in Canada, according to BioNB and Bioindustrial Innovation Canada.

“50 to 60% of the GHG reduction will come from low-hanging fruit. The next 40% will be very hard.” Venture Capital stakeholder response - From the DEEP Centre [“Canada’s Cleantech Investment Landscape”](#)

One proven strategy to growing a competitive bioeconomy is to move up the product value chain and increase the value Canada receives from its bio-resources. Currently, Canada’s value added per cubic metre of harvested wood – a proxy for how effective Canada has been at gaining market share in high value bioproducts – lags behind its competitors. There are several factors that contribute to this lag, including the geographic distance between resources and markets, global commodity markets and pricing system, the characteristics of Canada’s forest sector, and the relatively small size of Canada’s domestic marketplace. Even though one country can be difficult to compare to another, there is opportunity for Canada to move up the value chain. Canada’s relative position is illustrated in the graph below.

Graphic #1 – Economic rent (constant USD) per unit of roundwood production



Source: [World Bank](#) and [FAO](#).

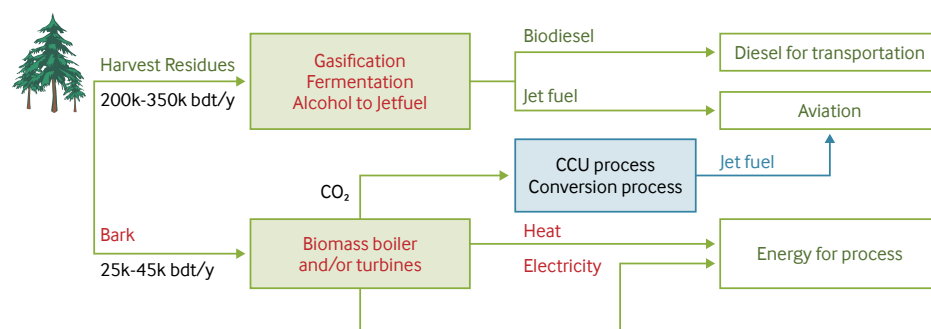
CCFM jurisdictions have a clear path to becoming leading producers of high value products in line with other countries. The recent Fibre Futures Project completed by EnVertis identified bioeconomy value chains with strong economic prospects and significant climate benefits suited to each of Canada's unique regions. These value chains have the potential to transform the Canadian bioeconomy into a high value sector and a central contributor to climate, environmental and social goals. This optimism is shared across Canada. [Ontario](#) and Quebec, among other provinces, have recently released strategies to accelerate their forest bioeconomies, increase the value of products, and expand their climate impacts.

The Fibre Futures Project assessed the Canadian forest bioeconomy and identified value chains in each of Canada's regions that have the greatest economic and climate potential over the near and long term. High potential value chains include lignin fractionation, conversion of pulp mills to bioproduct facilities, mass timber manufacturing, and (to a lesser extent) pyrolysis and gasification to produce biofuels.

Diagram #1: Biofuels – Gasification to Jet Fuel

VC 5 - Gasification to Jet Fuel

— 2030 — 2050

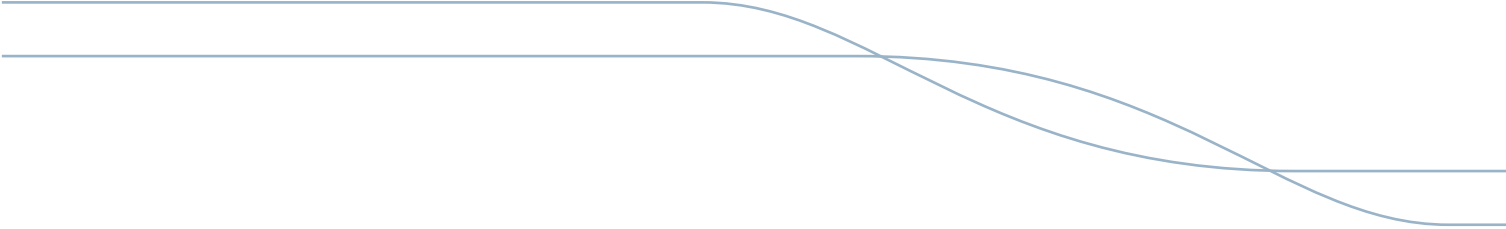


Inspiring examples

<p>Maturity: Technology Readiness Level (TRL) 8 (Gasification) Status: Commercial plant in Natchez, MS Capacity: 250,000 bdt/y https://www.velocys.com/projects/-bayou-fuels/ https://www.bayoufuels.com/ https://tri-inc.net/2017/01/26/tri-announces-partnership-with-velocys-plc/</p>	<p>Maturity: TRL 8 for Syngas Fermentation and TRL 7 (Alcohol to Jetfuel) Status: Announced, location chosen (Soperton, GA) Capacity: 10 M gallon /y https://techcrunch.com/2020/06/02/lanzajet-launches-to-make-renewable-jet-fuel-a-reality/</p>	<p>Maturity: TRL 4 Status: Pilot plant under development Capacity: unknown https://www.polymtl.ca/carrefour-ac-tualite/en/news/convert-ing-co2-emissions-aviation-fuel-polyte-chnique-montreal-leads-rd-project-qu-ebecs-support</p>
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VISION



The 2017 Framework provided a clear vision for the Canadian forest bioeconomy: **Canada will be a global leader in the use of forest biomass for advanced bioproducts and innovative solutions.** This vision places the forest bioeconomy at the centre of Canadian efforts to address climate change as a provider of low carbon building solutions, renewable energy, and feedstocks for sustainable chemicals and materials. It asserts that Canada's forest sector can take collaborative action to provide these solutions sustainably while contributing to Indigenous reconciliation and rural prosperity.

This vision is built on four pillars to enhance policy coherence and collaboration across jurisdictions. Pillar 1 is Communities and Relationships. Pillar 2 is Supply of Forest Resources and Advanced Bioproducts. Pillar 3 is Demand for Advanced Forest Bioproducts and Services. Pillar 4 is Support for Innovation. Jurisdictions across Canada have worked collaboratively to advance these priorities since 2017. The examples below represent a few highlights of work occurring across the country to advance the forest bioeconomy:

- To support communities and build relationships in the Newfoundland and Labrador forest sector, Memorial University has developed a bioenergy support network and is exploring innovation training for mill workers.
- To ensure the supply of forest resources, the province of British Columbia developed a new forest biomass supply information system (BioGIS) to improve their ability to source and track biomass volumes, qualities, and provide economic analysis to support efficient fibre utilization.
- To supply fibre and attract investment, Ontario is working with the Centre for Research & Innovation in the Bioeconomy (CRIBE) to develop an economic fibre supply model that will help investors and communities identify options for expanding the range of existing forest products and finding new markets.
- To grow demand for advanced forest bioproducts, Canada's Greening Government Strategy includes a commitment that all new building and major building retrofits prioritize low-carbon investments, including mass timber products.
- To support innovation, the province of Quebec has initiated an Innovation Zones program to facilitate interactions between companies and develop regional hubs, including forest activities and bioproducts.
- To support advancing its bioeconomy, New Brunswick is undertaking a cross-departmental effort to develop a shared vision, roadmap, and operational model to guide collaboration and decision making.

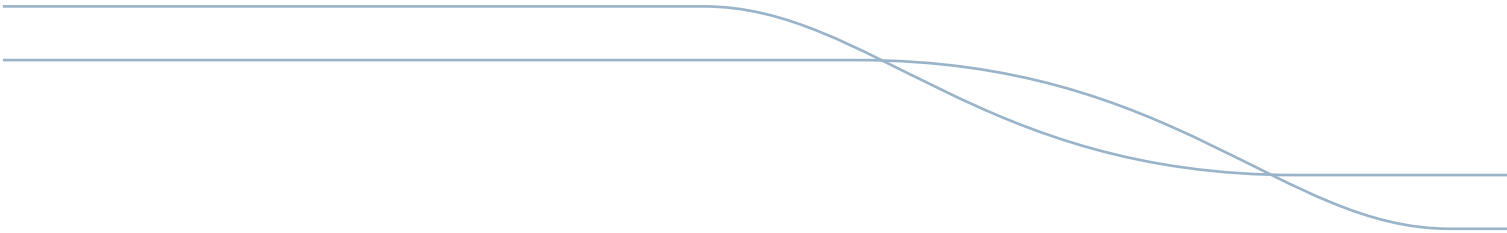
The CCFM's Renewed Forest Bioeconomy Framework advances two foundational objectives – accelerate Canada's bioeconomy and maximize the forest sector's contribution to achieving net-zero emissions – and a series of high priority actions that continue the work and overcome the challenges identified by CCFM jurisdictions over the last year.

As part of implementing *Sustainable Growth: Ontario's Forest Sector Strategy*, the province released a *Forest Biomass Action Plan* in 2022. This plan aims to support the use of forest biomass resources to secure jobs, promote economic development, and encourage sustainability in Ontario's forest sector.





CONTINUING CHALLENGES



Realizing the potential of the circular bioeconomy is well within Canada's abilities. Yet, a survey of Canadians in 2022 reveals that few consider themselves very well informed about Canada's bioeconomy, forest industry, or natural resource sectors (2%, 4% and 5%, respectively), which contributes to slow progress on harnessing the bioeconomy's potential. To help us get there, the CCFM jurisdictions identified high priority challenges that are relevant across the country:

- **Limited uptake** of bioeconomy opportunities among Indigenous communities;
- **Access** to a consistent, predictable, and competitively priced fibre supply for makers of bioproducts;
- **Attracting investment** for an industry – the forest bioeconomy – whose supply chains are not well known or understood;
- **Market uncertainty** created by the absence of definitions, standards, and certifications for bioproducts, including their climate performance (and that of the forest sector more broadly) both nationally and globally;
- The **environmental reputation** of the forest sector and communicating the benefits of the forest bioeconomy;
- **Access to focused funding** for demonstration projects to scale up full supply chain projects; and
- Ensuring **regulatory and policy alignment** and complementarity across Canadian jurisdictions and with global regulatory and policy leaders.

Coherent and collaborative efforts to address these overarching challenges and working towards the implementation actions outlined below will contribute directly to the 2017 Forest Bioeconomy Framework's vision for Canada and build upon work undertaken in the five years since the Framework was developed.

CHALLENGE

Limited uptake of bioeconomy opportunities among Indigenous communities

The 2017 Framework encouraged CCFM jurisdictions to work extensively with Indigenous communities to support bioeconomy development and economic reconciliation. In British Columbia, the province developed the Indigenous Forest Bioeconomy Program in partnership with Indigenous communities. It aims to identify and pursue forest bioeconomy opportunities with Indigenous groups across the province. In Ontario, the Wikwemikong Development Commission is partnering with local industry on a plan to manufacture pellets for community heat and local markets including heavy carbon emitters, which has the potential to expand Wikwemikong's economic base, as well as other Indigenous communities supplying biofibre. In Quebec, the Cree Quebec Council on Forest Economy's current major project is to network Indigenous and non-Indigenous businesses in the Nord-du-Québec region to maximize the use of wood resources and by-products resulting from processing for the development of value-added products. Similar projects are taking place in jurisdictions across Canada. To support Indigenous leadership in Canada's emerging forest bioeconomy, the CCFM has shared effective collaboration strategies and addressed widespread challenges. As jurisdictions work toward implementation of the Renewed Forest Bioeconomy Framework, it will be crucial to expand on this work and realize a forest bioeconomy where

projects are conceived, designed, and led by Indigenous communities and businesses.

Issue: Limited uptake of bioeconomy opportunities in Indigenous communities

There is an opportunity for Indigenous communities to play a larger role in bioeconomy projects and opportunities. However, tailored support is needed.

- **Action:** Jurisdictions could use the Renewed Forest Bioeconomy Framework as an opportunity to pursue dialogue with Indigenous communities to accelerate an inclusive forest bioeconomy as appropriate within each jurisdiction.

CHALLENGE

Access to a consistent, predictable, and competitively priced fibre supply for makers of bioproducts

Canada has nearly unparalleled reserves of sustainable forest fibre. However, that fibre is difficult to accurately measure and access. While inventories of forest residuals exist for much of Canada, the measurement, publication and reporting of biomass types and availability differs across the country. This issue also contributes to the under-use of residual biomass, which is typically in harvest areas. Without the data and an effective monitoring system to address this gap, it is difficult to assess the availability of biomass resources, accurately gauge biomass costs, and calculate associated environmental impacts.

Issue: Biomass Inventory

Consistent, standardized, and accessible biomass and carbon information across jurisdictions would make investment in biomass utilization more attractive.

- **Action:** Build on existing efforts to create regional biomass availability maps and carbon modelling to enable collaboration, increase utilization, and manage costs.¹

¹ Note: Provinces and territories regulate harvest levels on public lands in their jurisdiction according to their own laws, regulations and policies. The amount of timber that is permitted to be cut annually is based on sustainable forest management principles, which include forest health, conservation goals, wildlife habitat, water quality, soil health and biodiversity. For more, see [CCFM Sustainable Forest Management Policies in Canada](#) and [Canada's Forest Laws](#). The 2017 Framework and its 2022 Renewal adheres to sustainable forest management principles: accelerating the forest bioeconomy is aimed at fully utilizing and maximizing the value from what already harvested, or from material that is being re-used or recycled.

The Canadian Forest Service and FPIInnovations are working with Indigenous partners to develop an app for resource management on traditional territories. The app utilizes remote sensing data and crowd sourced data to create a repository of forest values that will facilitate effective and culturally relevant management of forest fibre and other resources from the forest with all stakeholders in the supply chain. The work builds on a previous project with the Mowachaht/Muchalaht First Nation.

Representatives of B.C. are interested in sharing the knowledge they have obtained through the Province's past efforts to inventory biomass availability with other Canadian jurisdictions to help accelerate the development of the forest bioeconomy.

CHALLENGE

Attracting investment for an industry – the forest bioeconomy – whose supply chains are not well known or understood

The findings of The Centre for Digital Entrepreneurship & Economic Performance's (DEEP Centre) Report highlight the challenges in seeking investment that Canadian bioeconomy innovators face. Bioproducts can be technically proven but have challenges attracting investors and breaking into the market due to investor unfamiliarity with supply chains and the performance of new forest bioproducts. This is a common challenge for new cleantech products and is particularly acute for bioproducts due to their high capital requirements and long commercialization timelines. However, this challenge has proven solutions. For example, Finland's TEKS (now Business Finland) takes a consortium approach, which brings together industry incumbents, innovative technology providers, investors, government, and regulators in order to spread risks, increase investor knowledge, and provide initial markets for new products. This consortium approach also has a proven track record when it has been applied in Canada's forest sector. Diagram #2, which outlines the successful commercialization of cellulose nanocrystals, is just one example of this approach in the Canadian forest sector.

Issue: Forest bioeconomy innovators have difficulty attracting partners willing to invest in new bioproducts and markets due to uncertainty about underlying supply chains

There is a need to support forest bioeconomy innovators by educating them about the forest bioeconomy and building partnerships along the entire supply chain.

- **Action:** Expand efforts to encourage collaboration among all players in the supply chain (e.g., a consortium) to spread risk and share expertise and market access.

The DEEP Centre Report assessed the cleantech investment landscape in Canada, the bioeconomy's position within the cleantech ecosystem, and identified key challenges and possible government of Canada responses.

The report can be found at "[Canada's Cleantech Investment Landscape](#)".

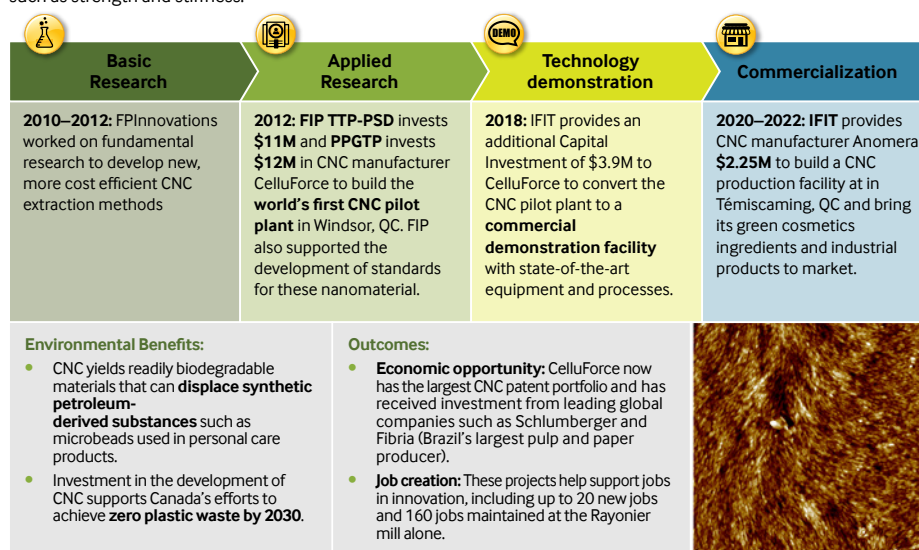
New Brunswick has partnered with Industry and FPInnovations to implement a pilot in 2022–23 that will determine the incremental costs associated with harvesting biomass in different stand types and with two different equipment configurations. This will help to inform the factors that impact the operability of biomass and could inform other jurisdictions' efforts to emphasize planning and utilization of biomass to increase availability and reduce biomass costs.

The success of CNC required support all along the value chain as well as collaboration between the private sector, regulatory and standards organizations, and multiple orders of government including the governments of Canada and Quebec.

Diagram #2: Canadian Success Stories – Cellulose Nanocrystals

IFIT & FIP Success Stories – Cellulose Nanocrystals

Overview: Cellulose Nanocrystals (CNCs) are a versatile forest-derived nanomaterial that can be added as a natural polymer to products including cosmetics, pharmaceuticals, textiles, paper and cardboard in order to improve properties such as strength and stiffness.



Issue: Investment risk in forest biomass supply chains

There is a need to reduce forest biomass supply chain uncertainty in order to decrease the investment risk in new bioeconomy projects and attract required capital. One example of using standards to reduce investor risk and help innovators and communities attract capital is the Bioeconomy Development Opportunity Zone (BDOZ) Initiative. It provides independent, third-party standards-based legitimacy to local supplies of biomass resources. "A" and "AA" ratings can identify areas in the country best positioned for low-risk bioeconomy project development.

- Action:** Work with standard development organizations, certification bodies, industry associations and other bioeconomy stakeholders to continue the development of regional risk-rating and supply certification programs that enable communities to leverage local biomass assets to attract new bio-based manufacturing plants and create jobs.

The concept of Bioeconomy Development Opportunity Zones and the supporting CSA Biomass Supply Chain Risk Standards builds on work presented to the CCFM Ministers in 2019.

In Ontario, the Centre for Research and Innovation in the Bioeconomy (CRIBE), EcoStrat, and Nawiinginiima Forest Management Corporation are working on developing a regional Bioeconomy Opportunity Development Zone (BDOZ) pilot in Ontario's Pic and White River Forest Management Units to assess applicability of the initiative within Ontario's tenure system.

CHALLENGE

Market uncertainty created by the absence of definitions, standards, and certifications for bioproducts, including their climate performance both nationally and globally

The majority of world commerce is governed by regulations-based product standards. An absence of product standards can limit market access. The World Business Council for Sustainable Development and many others assert that bioproducts have significant future commercial potential and could replace existing materials in numerous products such as petroleum-based fuels and consumer and industrial products. To unlock these potential markets there is a need for national and global standards and certifications for bioproducts.

Issue: Level of confidence in bioproducts performance and availability

There is a need to decrease the technical risks and uncertainty in bioproduct development to ensure end user confidence in the emerging bioproducts' quality, availability, and performance, including climate benefits.

- **Action:** Support the development of voluntary product standards with organizations and industry associations for biomass, biomaterials, biochemicals, and biofuels.

Issue: Access to international markets

There is need to ensure Canadian bioproducts meet international technical and phytosanitary specifications and standards (e.g., sustainability) and are eligible for sale in global markets.

- **Action:** Work with standard development organizations and bioeconomy stakeholders to develop international definitions and standards for biomass and bioproducts and their environmental performance.

Through the Canadian Standards Association (CSA) and the Standards Council of Canada (SCC), Canada is working with bioeconomy stakeholders to support the development of both National and International standards, which can help remove trade barriers, harmonize research and development activities, and support the development of regulations.

The CSA is leading the development of standards for cellulose nanomaterials (CNC, CF, etc.), which is helping Canadian producers sell their products both domestically and in the global marketplace.

CHALLENGE

The environmental reputation of the forest sector and communicating the benefits of the forest bioeconomy

CCFM jurisdictions have adopted laws and policies to manage their forests sustainably and Canadians expect forest practices to respond to the latest science to maximize environmental co-benefits and to provide healthy, resilient, and sustainable forests for future generations. There is an ongoing opportunity to build on existing sustainable forest management practices and to improve communication among Canadians to enable everyone to better understand the benefits of bioproducts, particularly in support of a forest bioeconomy.

Issue: Demonstrating how forest bioeconomy opportunities deliver economic benefits while delivering net GHG emissions reductions

The growth of Canada's forest bioeconomy requires targeted actions that demonstrate the ways economic opportunities in Canada's forest bioeconomy align with jurisdictional priorities related to reducing and managing carbon emissions.

- **Action:** Continue to support scientific and economic analysis and demonstration projects that seek to validate the range of expected economic, social, and environmental benefits offered by forest bioeconomy initiatives by subsector and by province and territory.

CHALLENGE

Access to focused funding for demonstration projects to scale up full supply chain projects

Innovation over the past decade has created a range of new products and new value chains that can utilize residues and low-grade fibre to produce high value bioproducts. The market for these products is growing as industry seeks to decarbonize. However, it is still difficult to bring products to market due to high risks associated with adopting new industrial technology and/or producing novel products. Unfortunately, the DEEP Centre's analysis suggests that large industrial incumbents view demonstration projects as expensive and risky and are reluctant to bear the costs of such projects alone, creating a significant gap in the innovation ecosystem. However, demonstrations have proven successful in the forest sector when they are undertaken with government support. The increasing use of mass timber detailed in the diagram below is one example of how demonstrations can unlock new opportunities for Canadian innovators.

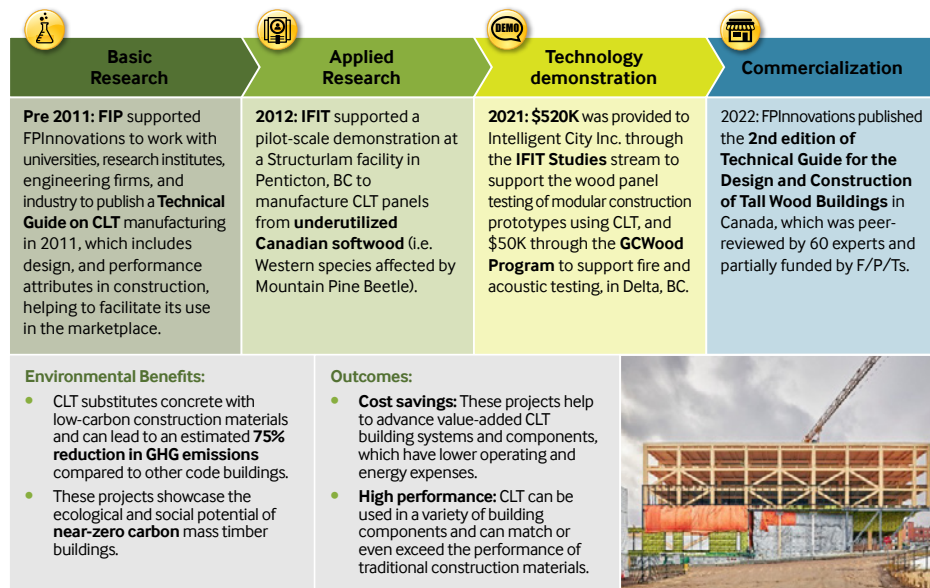
“Cleantech companies are operating in industries that have existed for hundreds of years. There is very little ground that hasn't been tread at some point. So the bar is very high for solutions that will work. It's not like digital, where there are wide open green spaces, and you can raise money around an idea without demonstrating that it works. In heavy industrial areas, you have to demonstrate a mature process. We have strong cleantech alternatives in chemicals, fuels, and water, but you must supplant the existing solutions that are proven and working at scale. The bar is incredibly high. There is no easy solution.”
Small-Medium Enterprise stakeholder response from the DEEP Centre
“Canada's Cleantech Investment Landscape”

The success of mass timber buildings and CLT in Canada was driven by demonstration projects that supported building code updates and encouraged collaboration between the private sector, regulatory and standards organizations, and the governments of Canada, British Columbia, and Quebec.

Diagram #3: Canadian Success Stories – Cross-Laminated Timber

IFIT & FIP Success Stories – Cross-Laminated Timber

Overview: Cross-laminated timber (CLT) is a light-weight yet robust engineered wood product that presents a significant opportunity for enhancing environmental performance in the construction sector.



Issue: Lack of access to support for demonstrations and scale up financing required to prove and commercialize bioproducts and technologies

There is a need to demonstrate the effectiveness of pre-commercial and commercial scale technologies and grow opportunities for first purchasers and market entrants that facilitate investment in new bioproduct supply chains.

- **Action:** Continue to coordinate support for demonstrations by all orders of government.
- **Action:** Continue to support government procurement of bioproducts by all orders of government.

CHALLENGE

Ensuring regulatory and policy alignment and complementarity across Canadian jurisdictions and with global regulatory and policy leaders

Shared responsibilities and a diversity of innovation, environmental, and forest policy across the country create valuable dynamism and diversity in Canada. However, improving alignment and complementarity across programs at all levels of government could help to accelerate the forest bioeconomy.

Issue: Unaligned programs at all levels of government reduce impacts

Governments across Canada support innovation, demonstration, and commercialization, but programs are sometimes not well aligned or may not allow stacking. This undermines their effectiveness.

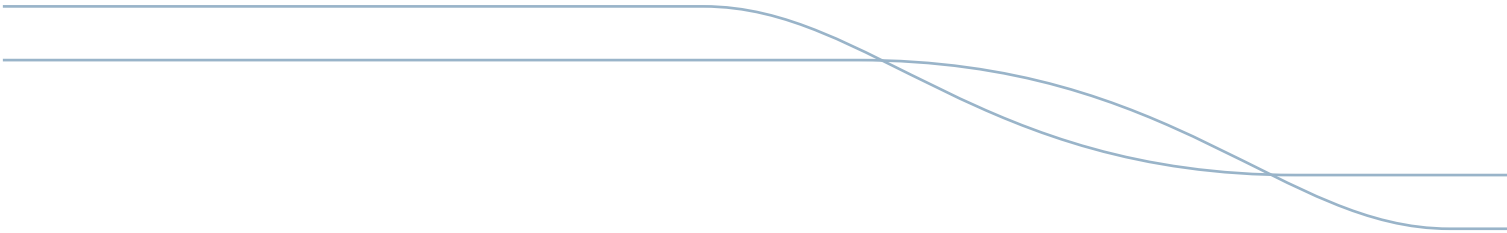
- **Action:** Support improved communication and seek complementarity across support programs at all levels of government, respecting the jurisdiction of each level of government, and ensure that bioeconomy companies can access this support.
- **Action:** Work through federal, provincial, and territorial tables to ensure coordination across Canada of policy and program supports for the forest bioeconomy at all levels of government.

The Biochar Production Facility in Haliburton, ON will have the potential to generate a net reduction of 4,200 tonnes per year of CO₂ equivalent emissions and offset more than 7,500 tonnes per year of CO₂ equivalent emissions because the biochar produced will be used to displace fossil fuel products in advanced manufacturing processes on a pound-for-pound basis.

In Alberta, University of Alberta researchers at the Faculty of Agricultural, Life & Environmental Sciences are working on biochar production for specific applications as part of Future Energy Systems, a cross-disciplinary research and teaching network working to develop innovations for the energy transition.



MEASURING PROGRESS AND REPORTING RESULTS



The 2017 Forest Bioeconomy Framework suggested a series of key indicators that could be used to establish a baseline for the forest bioeconomy and to measure the impacts of jurisdictions' actions to advance the forest bioeconomy. The CCFM remains committed to establishing a baseline and measuring the results of efforts to accelerate the forest bioeconomy. However, as discussed above, considerable differences in capacity, data availability, and even definitions exist across jurisdictions. To address these challenges the CCFM Innovation Committee will immediately begin work to identify measurable, appropriate, and shared metrics. It will also develop a strategy for reporting results to CCFM Ministers and to Canadians.

This work will build upon the foundation provided in the 2017 Framework. The Innovation Committee will focus on developing metrics that measure key areas of the bioeconomy, including:

- The significance of the forest bioeconomy in the Canadian economy
- Climate contributions from increased use of bioproducts
- Valuation for ecosystem goods and services
- Support for forest bioeconomy science
- Support for the forest bioeconomy

While appropriate metrics are being collaboratively developed in these areas, jurisdictions will work collectively to track and analyze the value (i.e., economic rent) of harvested fibre per cubic metre. This will provide a potential foundation for collaboratively developing a metric to assess acceleration of the forest bioeconomy.



CANADIAN COUNCIL OF FOREST MINISTERS

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