

BIOREFINING RESEARCH INSTITUTE

STRATEGIC PLAN

2019 - 2024



Lakehead
UNIVERSITY

Biorefining Research
Institute







The Biorefining Research Institute (BRI) strives to be the leading centre for innovation for forest biorefining technologies.

This technology will contribute to social and economic development across Northern Ontario and Canada through transforming the forest industry in a sustainable way and contributing to the growing Bioeconomy.

The BRI will contribute to the environmental sustainability and socio-economic prosperity of Northern Ontario, supporting the Canadian forest industry transition to new market applications and global opportunities.

ESTABLISHED IN 2008, THE VISION AND MISSION OF THE BRI ARE:

OUR VISION

Create a world-class centre of excellence that is among the national and international leaders in forest biorefining research, innovation, and training.

OUR MISSION

The Biorefining Research Institute will develop transformative, cost-effective, and environmentally sound technologies and bioproducts from renewable forest resources, train Highly Qualified Personnel, and be an active research partner in the Bioeconomy.

The BRI will work towards this vision through three primary pillars:



The BRI does not work in isolation, and a number of organizations have been identified as key stakeholders in the Bioeconomy. Of note is a strategy in the Lakehead University Strategic Plan that reads: “Establishing Lakehead University as a leader in environmental sustainability by integrating teaching, learning, research, and community and industry partnerships in the development of an international research centre focused on biorefining.”

Research for this BRI strategic plan included a review of relevant policy statements and strategic priorities developed by the following key government, institutional and Non-Government Organization (NGO) stakeholders. Their strategic foci are important for the BRI to align with over the next five years. This will ensure the BRI contributes to priorities locally and nationally. Key stakeholders and corresponding documents are noted below in alphabetical order.

STAKEHOLDER

DOCUMENT(S)

Bioindustrial Innovation Canada (BIC)	<ul style="list-style-type: none"> • 2016 Strategic Plan
BioInnovative Renewables Network (BiRNet)	<ul style="list-style-type: none"> • BiRNet Summary
Centre for Research and Innovation in the Bio-Economy (CRIBE)	<ul style="list-style-type: none"> • 2018 Strategic Plan
Forest Products Association of Canada (FPAC)	<ul style="list-style-type: none"> • VISION2020
FPIInnovation (FPI)	<ul style="list-style-type: none"> • Strategic Action Plan 2015-2020
Lakehead University	<ul style="list-style-type: none"> • Strategic Plan 2018-2023 • Academic Plan 2012-2017 • Strategic Research Priorities
Government of Canada	<ul style="list-style-type: none"> • Council of Canadian Forest Ministers - A Forest Bioeconomy Framework for Canada • Ministry of Innovation, Science and Economic Development Canada – Prosperity and Growth Strategy for Northern Ontario • 2015 Kenora Declaration for Forest Innovation
Thunder Bay Community Economic Development Commission (CEDC)	<ul style="list-style-type: none"> • Strategic Action Plan 2014-2017 (short version)



**ENGAGEMENT AND
COLLABORATION**



The BRI recognizes that its core strengths and future opportunities are clearly linked to its unique geographical positioning in Northern Ontario.

As a regional institute, BRI will be responsive to the needs of rural and remote communities in the areas of training and job readiness, and forest innovation research that contributes to economic and social development.

From an organizational standpoint, the BRI will leverage the strength of its stakeholders and External Advisory Board to attract funding, quality researchers, and students. This strategic plan will act as a guide to establishing annual priorities and accountability mechanisms.

KEY PERFORMANCE INDICATORS

- Dollars directly invested in BRI projects. Proportion of revenue from sources other than the BRI operating grant
- Number of contacts with municipalities, Indigenous stakeholders, government agencies and other stakeholders
- Number of collaborations with municipalities, Indigenous stakeholders, government agencies and other stakeholders
- Communications metrics (media, presentations, engagement meetings)
- Number of references in business magazines, resource sector blogs etc.
- Biennial International Forest Biorefining Conference (IFBC) deliverables and metrics, e.g. number of attendees, types of attendees

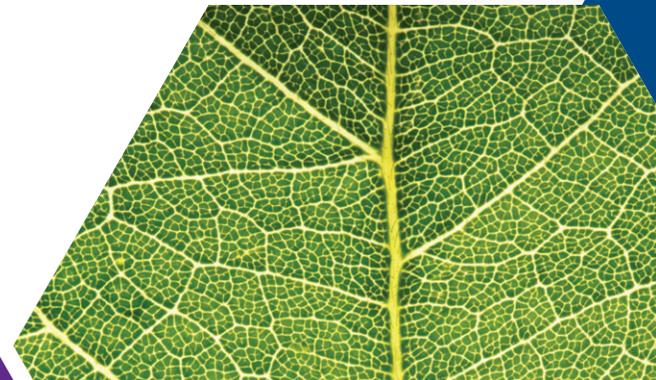
ENGAGED COMMUNITIES, FIRST NATIONS, GOVERNMENT, AND INDUSTRY

OBJECTIVES

1. Be responsive to Northern Ontario regional needs and opportunities around training, and social and economic development.
 2. Be responsive to Northern Ontario Indigenous stakeholders and communities around training, and social and economic development.
 3. Educate community leaders (stakeholders) and the general public about the potential of biorefining as one of the major drivers of the Bioeconomy.
 4. Raise the profile of the BRI and position it as an important resource and partner.
2. Engage with municipalities, business and industry to support knowledge exchange, innovation, economic development, student internships, and employment.
 3. Engage Indigenous stakeholders with the intent to exchange ideas on bioproduct and bioenergy priorities for communities, economic development opportunities, and training.
 4. Cultivate ties to relevant government ministers and staff/agencies to:
 - a. Position the potential of forest biomaterials, biofuels, and biochemicals.
 - b. Provide input into policy, participate in consultations, and act as a leader for specific initiatives.
 - c. Position the value of investing in local biorefining technology and the Bioeconomy with agencies responsible for operationalizing the federal Prosperity and Growth Strategy for Northern Ontario goals, and establish a role for the BRI.

ACTIONS

1. Establish a communications action plan, update communications materials, and communicate successes at every opportunity.
 - a. Organize a high profile international conference every two years to facilitate engagement and collaboration between researchers, industry, community leaders and government.



THRIVING BRI ORGANIZATION

OBJECTIVES

1. Develop a strong organizational structure that will inform research and commercialization priorities and help the BRI achieve its goals.
2. Create an administrative structure that will increase efficiency, accountability, and credibility of the organization.
3. Enhance the long-term research capacity and sustainability of the BRI.

ACTIONS

1. Solidify the organizational structure of the BRI, a clear role for the External Advisory Board, roles and responsibilities for Associate Members, and a process for annual operational plans and reports.
2. Diversify funding sources and achieve revenue growth (including certificates, research grants, industry partnerships, donors.)

- a. Explore the feasibility of establishing external services and contracts not directly related to BRI research as a way to generate additional revenue.
3. Ensure the BRI has a full complement of administrative and research staff to meet its strategic priorities.
 - a. Conduct a feasibility study on the establishment of a business manager or administrative lead. This position would complement the research leadership role of the director and focus on business development, industry partnerships, and administrative roles.
 - b. Work toward establishing full-time employment for a BRI administrative assistant and a technician to ensure the smooth operation of BRI and its facilities.
 - c. Work toward establishing full-time permanent employment for key researchers in the BRI through tenure/tenure-track positions.



**RESEARCH AND
DEVELOPMENT**



Meeting the needs of industries and companies along the value chain will continue to be a driving force behind BRI R&D projects. The BRI undertakes both a fundamental/proof of concept and applied research approach, and has a number of patents pending.

Moving forward, a priority is to create partnerships to commercialize new innovation and technology into practical applications and value-added products.

The BRI has established a niche in the biorefining field. It is uniquely positioned to prioritize products that help Northern Ontario forest industries transition to new market applications identified in FPAC's VISION2020. The research focus will be primarily on solving challenges in the following areas:

- The conversion of lignocellulosic biomass into platform chemicals, biochemicals, biomaterials, biofuels, and other high-end products along the value chain.
- The boreal forest as feedstock, with an emphasis on underutilized wood (hardwoods such as birch and poplar) and low-value residual materials, such as bark and sawdust.
- The use of underutilized co-products from forest industries, e.g., sludge, lignin, tall oil, effluents.

The BRI is based on the Biorefinery concept for complete value-added utilization of lignocellulosic biomass. The scope of the BRI will continue to be biofuels and bioproducts (biochemicals and biomaterials), thus contributing to innovations in a number of areas including but not limited to tall buildings (adhesives), textiles, pharmaceuticals, packaging, and bioenergy. The BRI will focus on lab-scale and pilot scale projects. Patents and commercialization opportunities will be actively pursued whenever possible. The innovation potential is vast and the BRI will work on new product development in response to the needs of potential customers in the Bioeconomy ecosystem.

The BRI is also a key player in the Bioeconomy ecosystem locally, nationally and internationally. Lakehead University has a number of world-renowned researchers in fields connected to biorefining, the Bioeconomy, and sustainable forest management. Collectively the faculty is in a position to support each other in biorefining research and development. The BRI will be proactive in connecting outside stakeholders with expertise and knowledge at Lakehead University.

KEY PERFORMANCE INDICATORS

- Commercialization indicators (invention disclosures, patent applications, successful patents, licenses, collaborative businesses and start-ups directly related to BRI activity)
- Number of external expert consultations (reviews, technical papers, government presentations)
- Number of industry research contracts
- Peer reviewed journal articles and conference presentations
- Number of academic research partnerships; number of joint publications
- Number of grants applied for vs number of successful grants; number of joint grant proposals

RELEVANT RESEARCH AND COMMERCIALIZATION PRIORITIES

OBJECTIVES

1. Ensure that research and innovation at the BRI are aligned with current and emerging needs of industry and customers along the value chain, both domestically and globally.
2. Increase the likelihood of innovation and commercialization through establishing priorities.
3. Increase support for forest utilization and biorefining technologies in Northern Ontario and potential downstream customers.

ACTIONS

1. Develop research activities that align with the needs of industry, potential customers and communities.
 - a. Engage regularly with community, industry, and business to identify emerging trends, short-term projects and long-term research needs in biorefining.
 - b. In consultation with key industry and business stakeholders and the BRI External Advisory Board, identify projects annually that have the potential to move along the innovation or commercial continuum in the next five years.

COMMERCIALIZATION OF BRI INNOVATIONS

OBJECTIVE

1. Move BRI innovations along the commercial continuum, ultimately into practical applications and value-added products.

ACTIONS

1. Establish partnerships with agencies with a mandate to do market validation.
2. Develop and implement commercialization plans for promising patents in consultation with industry, economic development stakeholders, and the Lakehead University Economic Development and Innovation office.
3. Connect biorefining research to potential downstream customers and commercialization or investment opportunities.
 - a. Work with BIC to educate and establish chemical industry customers along the value chain.
 - b. Participate in regional or provincial Clusters established by CRIBE or BIC.
4. Identify barriers and possible remedies related to Intellectual Property.

ACTIVE RESEARCH PARTNERSHIPS

OBJECTIVES

1. Enhance success and reduce duplication by increasing collaboration around biorefining internally among Lakehead University departments and faculty.
2. Enhance success and reduce duplication by increasing collaboration around biorefining externally with other national and international researchers.

ACTIONS

1. Partner with relevant national and international partners and networks and contribute to the Bioeconomy ecosystem. Opportunities are:
 - a. Contribute to the National Centres of Excellence application in partnership with other universities and researchers.
 - b. Be an active partner in the development of a Centre of Excellence in lignin and cellulose applications.
 - c. Explore interest and opportunity to enhance the relationship with national and regional FPI representatives in order to identify areas of collaboration.
 - d. Investigate opportunities to be an active member of national and international networks.
 - e. Investigate potential for collaboration on research projects with complementary organizations.
2. Build a culture of creativity and innovation, and a collaborative network of faculty, staff, and students within Lakehead University, expanding beyond traditional faculties to those with business and commercialization expertise.
 - a. Organize both formal and informal exchanges to build relationships and generate ideas and research priorities.
 - b. Collaborate with Lakehead University faculty from other departments and other post-secondary institutions to apply for large-scale institutional grants.





A purple hexagonal graphic containing a white outline of a person's head and shoulders with a star above it.

**HIGHLY
QUALIFIED
PERSONNEL**



The BRI will continue to stay abreast of emerging trends in order to provide relevant cutting-edge training opportunities.

It will continue to support Graduate and Post-Doctoral Fellow (PDF) positions and will work to increase the diversity of these positions by engaging and supporting under-represented student groups, especially Indigenous learners, to apply and succeed.

It currently attracts applicants from around the world and facilitates student and PDF exchanges with other universities through international partnerships.

There is a need and desire for greater hands-on experience and more opportunities for industry based experiential learning to increase job-readiness. There is an opportunity to incorporate complementary skill sets such as entrepreneurship, and opportunities to develop critical thinking and problem-solving skills are also recommended.

KEY PERFORMANCE INDICATORS

- Number of HQP hired by industry and business
- Number of HQP involved in commercialization activities
- Number of HQP involved in BRI-related projects
- Number of HQP involved in publications
- Number of HQP involved in presentations

EXEMPLARY FACILITIES AND STUDENT SUCCESS

OBJECTIVES

1. Students and researchers have access to high-quality lab facilities and training opportunities.
2. Students and PDFs are fairly compensated.

ACTIONS

1. Work with Lakehead University and Lakehead Student Union to address the financial needs of students. Issues are adequate compensation for international students and adequate Teaching Assistant (TA) reimbursement.
2. Enhance access to high-quality lab facilities and services.
 - a. Investigate opportunities to establish a pro bono system of collaboration among Canadian university labs, including other Lakehead University labs.
 - b. Develop an equipment and capital investment strategy, including expansion of the BRI space to accommodate more specialized equipment and learners.
3. Expand student exchange opportunities with international universities.

CROSS-CURRICULAR INTEGRATION

OBJECTIVES

1. Build interest and knowledge about the biorefining field among students in related departments.
2. Expose BRI students and staff to complementary skill sets.

ACTIONS

1. Work with other faculty to incorporate biorefining courses into undergraduate and graduate curriculum and to provide opportunities for internships within the BRI.
2. Incorporate a focus on entrepreneur skills into the BRI training model.

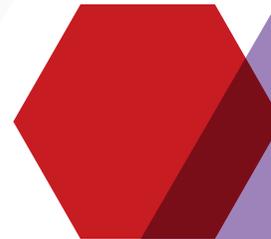
EXPERIENTIAL LEARNING AND JOB-READINESS

OBJECTIVES

- Increase job-readiness through greater hands-on experience and more opportunities for industry based experiential learning.
- Create interest in, and increase exposure to the biorefining field for individuals at different stages of their education.

ACTIONS

1. Collaborate with industry and other faculty/departments to apply for funding for industry internship opportunities.
2. Explore opportunities to establish programs that expose Indigenous learners to the biorefining field.
3. Evaluate opportunities to develop academic credentials related to the BRI, e.g. certificate programs, webinars, short courses, online learning.
4. Explore areas to collaborate with Confederation College.









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