



DRAFT  
MEMORANDUM  
OF  
UNDERSTANDING

SEPTEMBER 26, 2014

Memorandum of Understanding  
MBI International  
And  
Bioindustrial Innovation Canada

This memorandum of understanding (MOU) describes the intent of the following Parties:

**MBI International** (Lansing, MI), a U.S non-profit organization, focused on creating meaningful societal benefits by collaborating with universities, governments, financial supporters, and companies to accelerate the commercialization of bio-based technologies.

and

**Bioindustrial Innovation Canada** (BIC) (Sarnia, ON), a Canadian not-for-profit organization, catalyzing the commercialization of bio-based and sustainable chemistry-based technologies, creating jobs and economic value sustainably for Canada based in Sarnia, Ontario, Canada

This MOU consists of the following 11 articles and two appendices, a summary of facts and the MBI/BIC working group structure, respectively.

**Article 1. Introduction**

The Parties, MBI International and Bioindustrial Innovation Canada (BIC), both operate in the biomanufacturing and green chemistry sectors with an emphasis on commercialization and scale-up of bio-based materials, processes, and production. Both Parties are positioned to lead the growth, development, and success of their respective state/province's biomanufacturing and green chemistry sectors and contribute to the regional growth of the bio-economy through innovative research and a commitment to developing safer, sustainable, and cost-effective products and processes.

The rationale for a strong collaborative relationship between the Parties is compelling. Both Parties will benefit from increasing knowledge and mutually accessing a broader range of research and resources. This collaboration will expedite progress in solving the challenges associated with finding ways to achieve efficient production of commercial bio-based materials to compete successfully with petro-based chemicals. Facilitated access to each Party's respective networks and markets will represent another huge mutual benefit. This collaboration will further enable access to new international markets, a critical prerequisite for competing successfully in today's global economy.

The areas of collaboration will include:

- Research and development of lignin-based materials and chemicals;
- Research and development of chemicals from sugars; and
- Collaborative advocacy

**Article 2. Subjects of collaboration**

The Parties agree to work together to exchange information, to establish business relations between their networks, to promote the human capital agenda and to develop research, development and demonstration projects for technologies that convert sustainable feedstocks into energy and value-added chemicals and materials. Subjects for collaboration have been tentatively identified as lignin-based materials, chemicals from sugars, and collaborative advocacy. Other priorities may be added at a later stage.

Appendix A is a summary of facts for each Party and a more detailed explanation of the subjects of collaboration.

**Article 3. Approach to collaboration**

To ensure further development of this collaboration, the Parties will work together with their partners and members to identify opportunities within the determined priority areas. Relationships between industrial, academic and/or governmental organizations will be established in order to initiate joint projects in research, development, demonstration or commercial partnering. MBI and BIC will support the initiation of these projects and will work with their stakeholders to support funding initiatives. This collaboration will also contribute to building enablers for scientific community development, including sharing of knowledge and best practices, organizing seminars and scientific conferences, attracting and developing young talents, development of joint educational programs in the field of novel bio-based processes and products and wide communication of scientific results.

**Article 4. Information exchange**

The Parties agree to be open and exchange extended information about their organizations, participants and their broader networks for the purpose of joint projects. The Parties agree that there is no obligation to exchange this knowledge and any exchange takes place at the Parties' discretion.

**Article 5. Responsibility for costs**

The two Parties will be responsible for their own costs for establishing and conducting the cooperation, including their own expenses for visits, business trips, participation in meetings and other activities.

**Article 6. Working group**

The Parties agree to establish a working group, which will lead and coordinate joint activities and interactions between MBI and BIC. The working group will consist of representatives from both parties.

Appendix B describes the establishment and operations of this working group.

**Article 7. Duration and Termination**

(a) The term of this MOU shall commence on the effective date set forth below and shall continue for a period of 3 years.

(b) Either Party may terminate this MOU by providing written notice not less than two (2) months in advance of its desire to do so. Unless otherwise agreed, the termination of this MOU shall not affect the implementation of projects or programs established under it prior to such termination. This MOU may be extended by mutual agreement of the parties in writing.

**Article 8. Confidentiality**

The exchange of the confidential data between the Parties requires a separate confidentiality agreement.

**Article 9. Non-binding nature of the MOU**

The Parties acknowledge that the provisions of this MOU represent their common intentions to explore business linkages between each organizations respective partners. Except for Article 7, this MOU is not intended to create a legally binding contractual relationship between the Parties.

**Article 10. Non-Exclusive**

The Parties may work on and participate in any projects with other potential joint venture partners. However, such participation shall not be detrimental to the spirit of this MOU

**Article 11. Effective Date**

The effective date of this memorandum of understanding shall be 26 September, 2014.

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Signed:  
Bioindustrial Innovation Canada  
Alexander Marshall  
Chairman

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Signed:  
MBI International  
Allen Julian  
Chief Business Office

Appendix A  
Summary of Facts

## Chemicals From Sugars

- CONTEXT:
  - N. America is lagging behind Europe and Asia in production of bio-chemicals from sugar
  - Bio-based chemicals have potential to supplement and/or replace traditional petrochemicals
  
- NEEDS:
  - Development of biomass pretreatment technologies
  - Development of effective and efficient supply chains for feedstocks and products
  - Development of "drop-in" alternatives to petrochemicals

### MBI International

- In developmental phase of Ammonia Fiber Expansion (AFEX) technology to extract sugars from lignocellulosic biomass
  
- AFEX technology transforms voluminous agriculture waste products into productive, transportable feedstocks for bio-based chemical generation and other applications
  
- Has patented a strain of bacterium, *Actinobacillus succinogenes*, capable of digesting sugars for the creation of biosuccinic acid

### BioIndustrial Innovation Canada

- Leading the development of a bio-based cluster in Sarnia, ON
  
- Includes many sugar-based chemical producers:
  - Bio-ethanol
    - Suncor
    - Greenfield
    - IGPC
    - Woodland Biofuels
  
- Biosuccinic Acid
  - BioAmber

## Lignin-based Materials and Chemicals

- CONTEXT:
  - Lignin represents an abundant byproduct of bio-refining processes
  - Traditionally combusted for heat and energy
  - Opportunities for high-value chemicals and products exist
- NEEDS:
  - Development of separation technologies
  - Development of commercializable technologies from lignin waste streams

### MBI International

- Lignin represents the main waste product from the AFEX process
- Identification of a commercializable use for lignin increases the value of AFEX

### Bioindustrial Innovation Canada

- Lignoworks
  - Canadian network of industry, institutions, and government organizations who's focus is to develop industrial applications for lignin
  - BIC has institutional ties to Lignoworks
- Lignin will be a significant waste product from companies in the BIC cluster
  - Could provide another revenue stream

## Collaborative Advocacy

- CONTEXT:
  - MBI and BIC are sector leaders in their respective state/province
  - Parties have ties to prestigious research institutions; including institutions with sector-specific job training programs:
    - Michigan State University
    - Western University (ON)
    - University of Guelph
    - Lambton College
      - Currently training future technicians for the Bioindustrial industry
- NEEDS:
  - Champions of biomanufacturing/green chemistry sector in the Michigan/southwest Ontario region
  - Initiation and expansion of critical synergistic institutional relationships in Michigan and Ontario
  - Identification and analyses of public policies that support bio-based sector development
  - Training of High Quality Personnel (HQP) for technical positions in the biomanufacturing and green chemistry sectors

Appendix B  
Establishment and Operations of the  
MBI/BIC Working Group

This MOU calls for the establishment of a working group consisting of representatives of MBI International and Bioindustrial Innovation Canada. The MBI/BIC working group will meet biannually with one teleconference meeting and one face-to-face meeting.

The Michigan State University Center for Community and Economic Development (CCED) will facilitate the establishment and operation of the working group, provided resources are available.

Potential venues for face-to-face meetings include:

- Annual Binational Blue Water Corridor conferences
  - Co-hosted by the Southwest (ON) Economic Alliance (SWEA) and the I-69 International Trade Corridor Next Michigan Corporation

The MSU CCED Binational Collaborative team has previously established a binational Green Chemistry/Biomanufacturing Advisory Network, in which both Parties regularly participate. This activity has been carried out with the support of a Michigan Applied Public Policy Research (MAPPR) grant. The MSU CCED team will continue to support and convene the network, provided resources are available.