Bioeconomy strategies in Canada and the International Bioeconomy Forum

Erika Van Neste, Global Bioeconomy Summit
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Canada’s Industrial Bioeconomy

State of the sector

• Diverse, emerging sector that cuts across research disciplines, commodities, manufacturing streams
• Region-specific opportunities in biomass feedstock production and bioproduct manufacturing
• Predominantly small and medium enterprises (SMEs) with some multinational enterprise (MNE) investments

Barriers

• Market pull, signal and acceptance challenges
• New and complex supply chains at different stages of development
In 2015, 190 firms were involved in the production or development of non-conventional industrial bioproducts in Canada with estimated revenues of bioproducts at $4.27 billion and employment of 5,618.

Biofuels is the largest subcategory of the bioproduct industry in Canada - estimated revenues of $2.72 billion (or 63.7% of total bioproduct revenues), 111 firms.

Many firms indicate activity without sales. Many are in pre-commercial stages (research or product development).

<table>
<thead>
<tr>
<th>Firms reporting production or development activity</th>
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<tbody>
<tr>
<td>Biofuels</td>
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<tr>
<td>Bio-Energy</td>
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<tr>
<td>Organic Chemicals</td>
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<tr>
<td>Materials &amp; Composites</td>
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<tr>
<td>Intermediary Bio-chemicals &amp; Materials</td>
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<tr>
<td>Other</td>
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Growth Areas – Value and Volume

21 million metric tonnes of biomass from agriculture and forestry transformed into $4.27 billion revenue

$2.72 billion (63.6%) of that generated by biofuels

Canada’s agricultural bioeconomy

Future Growth Areas (lower volume / higher value)

Traditional focus (high volume / low value)

Data from the 2015 Bioproducts Production and Development Survey (AAFC, 2017).
Challenges of an Emerging Sector

Barriers to Production or Development of Bioproducts, 2015

- Lack of Financing
- Cost and Timeliness of Regulatory Approval
- Cost of Biomass
- Unreliable Quantity of Biomass
- Cost to Comply with Regulations
- Difficulty in Entering Commercial Marketplace
- Unreliable Quality of Biomass
- Absence of Adequate Product Standard Certification

Percent of Firms Reporting Major Obstacle

Source: Statistics Canada and AAFC calculations.
Canada’s Bioeconomy Potential - Abundant Sustainable Biomass

- Canada is home to 43% of the world’s certified forests with the “most advanced regime of forest management and conservation in the world”
- Large amount of residues and wastes available for bioenergy without additional green tree harvesting
  - Harvest residues and unused wood 20 Mt/yr
  - Salvage from natural disturbance 51 Mt/yr
- Controlled removal of excessive crop residues can reduce tillage and improve soil quality
  - Crop residues 20 Mt/yr (IEA)
- Biodigestion of manure and food wastes is a proven manure management strategy and generates clean electricity
  - Recoverable manure 58 Mt/yr (IEA)

Pressures on Traditional Biobased Sectors

- To use residues
- To move up the value chain
- To diversify markets and products

Changing consumer trends and policy objectives
Governments can accelerate the development of the bioeconomy

**Influence**
Analysis/advice/advocacy, international negotiations, engaging OGDs, provinces, territories and other stakeholders, developing foundational data

**Policy and Programs**
Incentive, loans, grants, tax measures, procurement

**Regulations and Standards**
Standards, codes, regulations (e.g. building codes, criteria and indicators)

**Science, Technology and Knowledge**
Funding for, or direct involvement in, science and technology development as well as knowledge transfer
Government of Canada’s Clean Growth Agenda – Opportunities for Bioeconomy

• Clean technology, Innovation, and combatting Climate Change are key Government of Canada priorities

• Pan-Canadian Framework on Clean Growth and Climate Change is focused on achieving GHG reductions and transitioning to a low-carbon economy.
  – Carbon pricing
  – Clean Fuel Standard
  – $2B Low Carbon Economy Fund

• Commitments to Clean Technology and Innovation also have potential to contribute to clean growth, and offer opportunities for the bioeconomy

• International commitments
Canada can build on its strength in biobased sectors

- Large supply of sustainably managed biomass resources
- Well-integrated wood biomass product supply chain networks
- Emerging agri-based clusters and supply chains
- Biomass science and technology leadership
- Provincial engagement and buy-in
A decentralized movement...

- Different drivers, different strategies/policies across Canada
  - Heating in NWT or Yukon
  - Agriculture in Manitoba and Saskatchewan
  - Industrial development in Ontario
  - Forestry resources in British Columbia, Alberta and Quebec
  - Aquatic resources in Atlantic provinces

- Federal Provincial Initiatives
  - Canadian Council of Forest Ministers Forest Bioeconomy Framework
  - Canadian Agriculture Partnership

Biomass can be a source of solutions to traditional sectors and to a greener economy.
Canada will be a global leader in the use of sustainable forest biomass as part of the transition to a low carbon economy.

CCFM Forest Bioeconomy Framework for Canada (2017)
The Forest Bioeconomy

Advanced materials: Cellulose nanomaterials

Platform chemicals: Lignin and derived chemicals

Renewable energy for heating or fuel

Advanced Building Systems for tall buildings
Support for the Agricultural Bioeconomy

• Currently, no unified national strategy for the agricultural bioeconomy, but support through existing programming and initiatives
  • Bioproducts Ag-Sci Cluster administered by Bio-Industrial Innovation Canada (ending March 2018)
  • **Agricultural Clean Technology Program** - $25M in support spanning the innovation continuum for agri-based bioproducts and precision agriculture
  • Agricultural innovation programming through the **Canadian Agricultural Partnership**

**The Canadian Agricultural Partnership** is a five-year, $3 billion investment by federal, provincial and territorial governments to strengthen the agriculture and agri-food sector.

- **Growing Trade and Expanding Markets**
  - **AgriMarketing**
    - Focused on helping increase and diversify exports through industry-led promotional activities.
  - **AgriCompetitiveness**
    - Assist industry-led efforts to provide producers with the information they need to build capacity and support the sector’s development.

- **Innovative and Sustainable Growth in the Sector**
  - **AgrilInnovate**
    - Aims to help applicants get their innovative projects that increase competitiveness and sustainability to market.
  - **AgriScience**
    - Helps accelerate the pace of innovation by supporting pre-commercialization activities and investing in cutting-edge research.

- **Supporting Diversity and a Dynamic, Evolving Sector**
  - **AgriDiversity**
    - Strengthens the sector by helping diverse groups build skills and take on leadership roles.
  - **AgriAssurance**
    - Supports industry in meeting consumer needs for Canada’s high quality products.
Agricultural Clean Technologies Science Strategy

**FOUNDATIONS / INPUTS**
- **INVESTMENTS**
- **RESEARCH TEAMS**
- **LABORATORIES**
- **FIELD FACILITIES**
- **LANDSCAPE LIVING LABS**
- **PARTNERSHIPS**

**STRATEGIC OBJECTIVES**
- **INCREASE AGRICULTURAL PRODUCTIVITY (P)**
- **ENHANCE ENVIRONMENTAL PERFORMANCE (E)**
- **IMPROVE ATTRIBUTES FOR FOOD AND NON-FOOD USES (A)**
- **ADDRESS THREATS TO THE VALUE CHAIN (T)**

**OUTPUTS**
- **BIOENERGY CROPS**
  - (e.g., production on marginal lands)
  - **BIOPRODUCT VALUE CHAIN DEVELOPMENT**
- **SUSTAINABLE INTEGRATION OF BIOMASS FEEDSTOCK CROPS**
  - **REDUCING INPUTS**
    - (e.g., energy, nitrogen)
  - **INCREASING BIOENERGY PRODUCTION AND METHANE CAPTURE**
- **MORE EFFICIENT DECONSTRUCTION OF CELLULOSIC FEEDSTOCKS**
- **DIVERSIFIED UTILIZATION STREAMS**
- **SUSTAINABLE CROP PERFORMANCE**
- **PEST AND DISEASE MANAGEMENT, TOLERANCE**
- **SUSTAINABLE FEEDSTOCK VALUE CHAINS**

**OUTCOMES**
- **CLEAN ECONOMIC GROWTH:**
  - **INCREASED BIOBASED RENEWABLE CONTENT OF ENERGY, CHEMICALS AND MATERIALS**
  - **INCREASED ADOPTION OF AGRICULTURAL CLEAN TECHNOLOGIES**

- **MITIGATION OF GLOBAL WARMING TO ADDRESS CLIMATE CHANGE:**
  - **REDUCED CH₄ AND CO₂ EMISSIONS FROM LIVESTOCK**
  - **REDUCED CO₂ AND N₂O EMISSIONS FROM AGRICULTURAL LAND**
  - **REDUCED METHANE EMISSIONS FROM AGRICULTURAL WASTE**

New Knowledge, Clean Technologies, and Processes for:
Federal Support Across the Innovation Continuum

Basic Research
- SR&ED Tax Incentives (all sectors – CRA)
- Forest Innovation Program (forest – NRCan)
- Departmental Labs (all sectors – NRCan, NSERC)
- Canadian Wood Fibre Centre (forest – NRCan)
- Strategic Partnerships Program (all sectors – NSERC)

Applied R&D
- AgriScience Program (AAFC)
- AgrInnovate Program (AAFC)
- Industrial Research Assistance Program, IRAP (all sectors – NRC)

Demonstration
- Agricultural Clean Technology (ACT) Program (PT applicants, can be in partnership with industry)
- FPInnovations (forest – NRC, Provinces and Territories, Industry)
- Strategic Innovation Fund (all sectors - ISED)
- Agricultural Greenhouse Gases Program (AAFC)
- Mission Innovation (all sectors – NRCan)
- Mission Innovation (all sectors – NRCan)
- ecoEnergy programs (energy – NRCan)
- SDTC Tech Fund (all sectors – ISED)
- Research Programs (all sectors – NRC)
- Low Carbon Economy Fund (all sectors – ECC)

Commercialisation / Market Entry
- Green Construction through Wood (GCW) Program (forest – NRCan)
- IFIT (forest – NRCan)
- Clean Growth Program (NRCan)

Market Development
- Regional Development Agencies (all sectors)
- Trade Commissioners (all sectors - GAC)
- Invest in Canada Hub (all sectors - GAC)
- BDC (all sectors)
- EDC (all sectors)

Solution deployment
- Clean Fuels Standard (all sectors - ECC)
- Carbon Pricing (all sectors - ECC)
- Clean Energy for Rural and Remote Communities (all sectors – NRCan)
- IPI (forest – NRCan)
- Expanding Market Opportunities (forest – NRCan)
- Infrastructure Bank (all sectors)
- Low Carbon Economy Fund (all sectors – ECC)
- Beneficial Management Practice incentives under Environmental Farm Plans (Agriculture)

AgriMarketing Program (AAFC)

Agriculture and Agrifood Canada – AAFC
Business Development Bank of Canada - BDC
Canada Revenue Agency - CRA
Environment and Climate Change Canada – ECC
Export Development Canada - EDC
Global Affairs Canada – GAC
Innovation, Science, and Economic Development Canada – ISED
National Research Council Canada – NRC
National Science and Engineering Research Council of Canada - NSERC
Natural Resources Canada – NRCan
The International Bioeconomy Forum (IBF) was initiated by the European Commission with the aim of providing a flexible multilateral mechanism where global partners could discuss and act on common thematic challenges in research and innovation, and policy alignment related to the bioeconomy.

The IBF is currently made up of seven members – European Commission, New Zealand, South Africa, India, China, Argentina, Canada and US.
IBF Results to Date

• Canada confirmed its participation in the IBF (October 2016)
• EU announced the IBF (October 2016)
• First plenary meeting of the IBF (November 2017)
  – Co-chaired by EC and Canada
  – Launch of the IBF
  – Governance model adopted
  – Two working groups established
• Canada and EU Co-Chairs (2017-2020)
IBF Working Groups

- **Working Groups** – the work of the IBF is undertaken in organised ad-hoc working groups, which guide international cooperation on key research and innovation priorities and horizontal activities which are crucial for the development of a global, sustainable bioeconomy

- Established working groups include **Microbiome and ICT in Precision Food Systems**

- Implementation of IBF working group work plans are in progress

- New IBF Working Groups are currently being proposed (e.g. Plant Health, Bioeconomy Indicators)
Opportunities for Collaboration Under IBF

**GOVERNMENT OF CANADA**
- International trade and relations
- National policy and regulatory framework
- National reporting

**IBF**
- Science and technology
- Market and Trade Development

**OTHER NATIONAL GOVERNMENTS**
- International trade and relations
- National policy and regulatory framework
- National reporting

- Cooperate on common goals (e.g. non-competitive R&D, market development and trade, etc.)
- Cooperate on common challenges (e.g. sustainability, climate change mitigation, etc.)
- Establish common definitions, indicators, codes and standards, etc.