



Agricultural Bioeconomy and Innovation Toward a Net Zero Future

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Canada

The Potential of the Bioeconomy is Vast

McKinsey Global Institute

- Globally 60% of the physical inputs could be made using biological means by 2030
- Agriculture, aquaculture, and food – USD\$800B-\$1.2T global annual growth
- Materials, chemicals, energy – USD\$200B-\$300B global annual growth

The Bio Revolution, 2020

World Business Council for Sustainable Development

- Shift to sustainable circular bioeconomy is USD\$7.7T business opportunity by 2030
- Demand for biomass, including food and feed, grows to 27B tonnes by 2030
- Biobased packaging demand for biomass to grow to 352M tonnes by 2030
- Bioenergy and biofuels demand for biomass to 2.4B tonnes by 2030

The Circular Bioeconomy, 2019

Distribution of key agricultural commodities across Canada

In 2018, the agriculture and agri-food system:

- generated CAN\$143.1 billion of GDP, accounting for 7.4% of Canada's total GDP
- employed ~2.3 million people representing 12.3% of Canadian employment.
- Canadian agriculture and agri-food exports reached CAN\$59.4 billion in 2018.
- Top products by value were canola, fresh and frozen beef and veal, and fresh vegetables.

Vast expanses of Canada are small rural communities with access to large amounts of renewable feedstock (canola, hemp), waste (manure) and by-products (wheat straw) to fuel bioeconomy innovation.



Source: Statistics Canada.



The Bioeconomy in Canada Today

The industrial bioeconomy provides significant benefits:

- Reduce agricultural and agri-food sector GHG emissions and reduce carbon intensity of products
- Diversify opportunities and create markets for co-products, by-products purpose grown crops
- Add jobs and value, sector improving incomes
- Substitute for non-renewable inputs in commercial products
- Add value to agricultural commodities for farmers and food processors

Adds value and valorizes residues

- In 2015, ~8.8Mt of agricultural feedstock –mostly grains and oilseeds – were transformed into bioproducts
- Total revenue from bioproducts production was CAN\$4.27B and employed 5,618 people. Ethanol and biodiesel contributed CAN\$2.72B (2015)

Delivers emissions reductions and drives demand

- Canada produced 178ML of biodiesel from canola, 423ML of ethanol from wheat, and 2.5BL of ethanol from corn in 2019
- The Clean Fuel Regulations will account for up to 26.6Mt of GHG emissions reductions in 2030. This includes more biofuel blending, which will deliver 6.7Mt in GHG reductions, beyond reductions achieved by existing blend mandates.



Growing our Bioeconomy

The 2021 Guelph Statement called on Canada “...to rise to the climate change challenge, to expand new markets and trade while meeting the expectations of consumers, and to feed Canadians and a growing global population.”

Canada needs the bioeconomy to realize its vision of a sustainable and productive agriculture and agri-food sector

Developing and Deploying Bioeconomy Solutions

- Sustainable Canadian Agricultural Partnership
- Agricultural Clean Technology Program
- Canadian Agricultural Strategic Priorities Program
- Food Waste Reduction Challenge
- AgriScience

Bioeconomy Policy Support

- Initial work is starting on overarching agriculture-specific environmental and bioeconomy strategies
- Provide greater coherence, policies, and market incentives for greater impact
- Address data gaps and coordinate approach to encourage sector growth
- Continue to advocate for sector opportunities

Creating a Supportive Ecosystem

- Biomass Quality Network
- BIMAT and Holos and other identification and measurement tools
- Collaboratively develop bioeconomy standards with Government partners and certification bodies

The Bright Future of Canada's Bioeconomy

Bioeconomy opportunities to drive economic growth, improve sustainability, and reduce emissions

Biogas

- Commercial technology with potential to reduce Canada's total GHG emissions by 9.3Mt CO₂e in 2030 and 22.2Mt CO₂e in 2050.
- Potential to create 19,000 new jobs and drive CAN\$381M in new investment to the agricultural sector by 2030

Biodiesel

- Commercial technology with potential economic impact to reach CAN\$14.1B by 2030
- IEA forecasting predicts that renewable diesel demand will nearly triple between 2020 and 2026 to due primarily to US and EU climate policy

Biorefining

- Cellulosic ethanol can be produced from agricultural or forest residues
- High value chemicals can take advantage unique feedstock properties
- Leverages expertise from petrochemical sector

Biochar

- Forest residues can provide high quality biochar
- Potential to improve soil health and reduce fertilizer needs
- Potential to sequester carbon in agricultural soils for decades to centuries