Embracing the genius of nature for agriculture, construction and transportation industries.

BioComposites Group

SUSTAINABILITY PERSPECTIVE 2024

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INTRODUCTION

BioComposites Group (BCG) is an innovative company based in the Canadian prairies, specializing in designing and manufacturing products that leverage the mechanical qualities of industrial hemp. BCG sources its raw materials from local farmers and processors, with a strong commitment to sustainability and supporting rural economies.

BCG harnesses remarkable properties of industrial hemp to create sustainable, high-performance products that address critical challenges across various industries.

Automotive: BCG creates hemp-based composites for automotive interior components, which are lighter, sound dampening and more sustainable than conventional materials. These composites improve fuel efficiency and align with the transportation industry's shift towards greener technologies.

Construction: BCG's hemp composites are used for insulation and panels in construction, offering superior thermal and acoustic properties. These materials are not only sustainable but also enhance buildings' energy efficiency.

Agriculture: BCG offers solutions to combat weeds, reduce water consumption, and manage increasing temperature extremes. Our hemp ground covering products improve soil health, support vegetation management efforts and create zero waste. Additionally, hemp-based animal and pet products outperform mainstream solutions while offering additional health and waste reduction benefits.

MESSAGE FROM OUR CO-FOUNDERS

Brenda and I always believed that replacing synthetic products with locally grown, natural products would result in a better world. They began a journey of manufacturing natural fibres into healthy, earth-friendly products at commercial scale in 2010.

We were, and still are, pioneers. Many of the products designed, manufactured and sold have not been made before. Our suppliers, employees and customers work together to create innovative products. These products are more sustainable and perform better than other synthetic options.

Little did we know we would lead a hemp-fibre uprising where farmers, rural communities, employees, consumers and Earth would all benefit.

"WE ARE SO PROUD OF ALL THOSE WHO WORK IN AND SUPPORT THE HEMP INDUSTRY. WE WILL CONTINUE TO DO OUR PART TO ENSURE THAT HEMP BENEFITS ALL THOSE INVOLVED."

Dan and Brenda Madlung, Co-Founders of BioComposites Group.

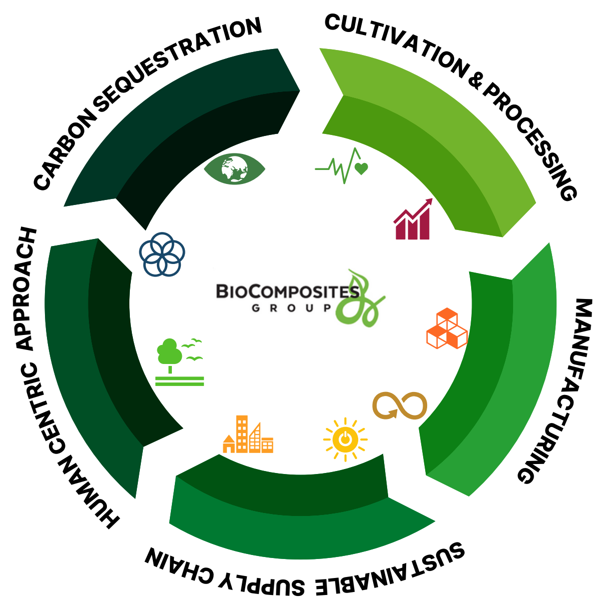
WHY HEMP?

Hemp is a versatile crop that can be grown sustainably, supporting agricultural practices that benefit the environment. Because of its deep roots, hemp cultivation improves soil health by preventing erosion, adding organic matter, and promoting biodiversity.

There is a positive impact on the soil organic carbon during hemp cultivation. Soil organic carbon is in a constant state of change, due to the input of new carbon in the form of plant or animal material, or root exudates, and carbon output in the form of soil-organism respiration or erosion.[1] Hemp's deep roots release organic compounds that enrich the soil. Roots, stalks, and leaves break down, adding carbon to the soil. Increased carbon improves structure, water retention, and nutrients, making hemp ideal for crop rotation.

Hemp insulation has good thermal properties, which can help maintain a stable indoor temperature. This reduces the need for heating in the winter and cooling in the summer, leading to lower energy consumption. Hemp insulation is breathable and can regulate moisture. This prevents the buildup of humidity and mold.

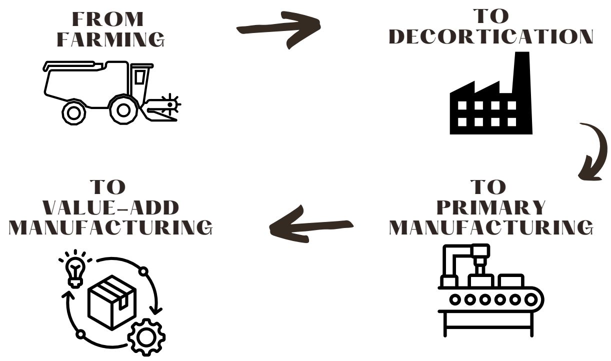
Hemp panels and insulation typically require less energy to produce than conventional materials like fibreglass, rock wool, or foam. This means that from a life-cycle perspective, hemp insulation can reduce a building's overall energy footprint. For the automotive industry, it reduces waste and carbon intensity of the vehicle's components. Hemp products are durable and have a long lifespan.



[1] Metcalf Foundation, "Recruiting Soil to Tackle Climate Change: A Roadmap for Canada." https://soilcc.ca/programs/recruiting-soil-to-tackle-climate-change/

CULTIVATION AND PROCESSING

Hemp has a very low environmental impact. It requires significantly less water than other crops, like cotton, making it a more water-efficient option. It is also naturally resistant to pests and diseases, reducing the need for chemical pesticides and herbicides.



Hemp also has superior soil health benefits. Its deep roots break up the soil at a deeper level and improve soil structure by replenishing nutrients, making it a great rotational crop that can revitalize degraded soils.

Hemp is a rapidly renewable resource that matures in just a few months. This makes it a sustainable alternative to slower-growing timber and other non-renewable materials.

Hemp processing creates very little to no waste. Almost every part of the hemp plant can be used. We use fibres to produce panels and mats (hemp blankets). The plant's woody core (hurd) is used for hempcrete and animal bedding. Dust and fines are used as a plastic substitute. By working with local hemp seed farmers, we utilize their straw, which would otherwise be considered waste.

This reduces waste and creates a circular production system. Hemp processing requires less energy than traditional fibres like cotton, especially in the decortication processes, making it an eco-friendly choice for sustainable cultivation and processing.

RESPONSIBLE MANUFACTURING AND PRODUCT CIRCULARITY

BioComposites Group employs an efficient, zero-waste production model that maximizes the utility of industrial hemp. Through advanced decortication processes, we separate and refine hemp fibres with precision, ensuring minimal waste generation. Every part of the hemp plant is utilized: fibres are processed into high-performance mats and panels, the woody core (hurd) is repurposed for hempcrete and animal bedding, and finer residues, such as dust, are used as plastic substitutes. This holistic approach not only minimizes waste but also creates a circular production system that aligns with our commitment to sustainability and resource efficiency. By leveraging cutting-edge manufacturing techniques, we ensure that our products deliver superior performance while preserving environmental integrity.

BCG employs energy-efficient equipment and optimized processes to reduce idle time and conserve resources. By incorporating frequency drives on motors and streamlining production workflows, we minimize energy consumption and enhance operational efficiency. These measures are integral to our commitment to sustainable manufacturing and achieving a zero-waste production model.

Product Circularity

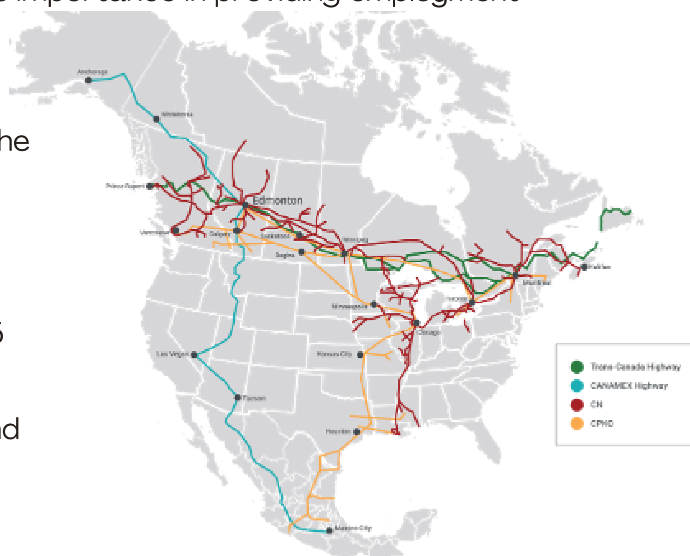
At their end-of-life, products like hemp insulation can be repurposed into aggregates for hempcrete, while consumers or commercial composting systems can compost animal hemp bedding. When composted, hemp bedding breaks down naturally into nutrient-rich organic matter that can be used to improve soil health. If disposed of in landfills or outdoor environments, hemp bedding biodegrades much faster than synthetic alternatives, often within months. Our hemp geotextiles will support soil regeneration, creating a circular lifecycle.

SUSTAINABLE SUPPLY CHAIN

Integrating hemp-based construction products into the supply chain provides numerous advantages, including sustainability, cost-effectiveness, and resilience. These benefits contribute to a more efficient, environmentally friendly, and robust supply chain, meeting the growing demand for green building materials and supporting broader sustainability goals.

By reducing the distance goods travel from producer to consumer, the emission of greenhouse gases is significantly lower, contributing to the fight against climate change. By supporting local supply chains, we also boost the regional economy, encouraging money to circulate within local communities and creating jobs. It also revitalizes rural agriculture, allowing farmers and producers to thrive in a market increasingly dominated by large-scale, commercial agriculture. Communities in rural, remote, coastal, and northern regions contribute over 25% of Canada's GDP, playing a crucial role in driving economic growth and sustaining the national economy.[2] In 2018, approximately 1 in 5 jobs in these regions were in the manufacturing sector, underscoring its importance in providing employment opportunities outside urban centers.[3]

Our facility is strategically located in the Edmonton Region, a nexus point for business exports and global logistics. Canada's 15 free trade agreements across 51 countries open access to 1.5 billion consumers. The Region's port access, extensive railway networks, and connection to strategic road transportation corridors.



[2]Rural Economic Development, from Innovation, Science and Economic Development Canada: https://ised-isde.canada.ca/site/rural/en
[3]The Future of Rural Manufacturing, OECD, 31 October 2023: https://www.oecd.org/en/publications/the-future-of-rural-manufacturing_e065530c-en.html?utm_source=chatgpt.com

UNIQUE CARBON SEQUESTRATION POTENTIAL OF HEMP

Hemp is an ideal nature-based mechanism to capture atmospheric carbon, both due to the positive impact the cultivation of hemp has on soil organic carbon and the remarkable amount of stalk produced that may be stored in long-term applications.

Plant roots contribute to carbon sequestration by releasing organic compounds that enrich soil organic carbon. Hemp has the benefit of deep taproots, increasing the carbon added. Crop residues, such as roots, stalks and leaves, break down into organic matter in the soil, adding carbon. A higher carbon content enhances soil structure, water retention, and nutrient availability. Hemp grown in a crop rotation system offers these benefits to landowners looking for a rotation crop.

CARBON CAPTURING

IT IS IS ESTIMATED THAT HEMP REMOVES A RANGE OF 3.6 TO 5.4 TONNES OF CO2 PER ACRE.

- As industrial hemp is cultivated, it absorbs atmospheric CO2 during photosynthesis and converts it into biomass. This biomass, including components such as hurd and bast fibre, acts as carbon storage until decomposition.[4]

- In applications such as hemp insulation or interior car panels, the carbon remains stored for the lifetime of the insulated structure or a vehicle, offering significant longevity to the sequestration.

[4] James Vosper, "The Role of Industrial Hemp in Carbon Farming."

PEOPLE FIRST

The northern climate offers an ideal growing environment for hemp cultivation. Adding hemp to the common cultivating crop offers farmers diversification. Cultivating, processing, and manufacturing hemp products creates jobs in agriculture, manufacturing, and construction. Our work is driven by innovation and continuous improvement.

Our hemp-based products are non-toxic and do not emit harmful chemicals, contributing to healthier indoor air quality and reducing health risks. Hemp products help create more comfortable and healthier living environments by providing better insulation and moisture regulation.

Promoting the use of hemp in construction involves collaboration between farmers, manufacturers, policymakers, and the construction industry. These partnerships can collectively drive progress towards sustainable development goals.

The manufacturing sector significantly contributes to Canada's economy, generating over $750 billion in output and nearly $200 billion to GDP.[5] This sector's economic multipliers indicate that for every dollar generated, there is a substantial ripple effect throughout the economy, benefiting various industries and services. In Alberta, small businesses represent 98% of all businesses, highlighting their importance in the rural economy. Rural manufacturing and farming investments stimulate these small enterprises, creating jobs and economic diversification.[6]

[5] Economic Multipliers and Canada's Manufacturing Sector, Trillium Network for Advanced Manufacturing: https://trilliummfg.ca/data-bulletin/economic-multipliers-and-canadas-manufacturing-sector/?utm_source=chatgpt.com.
[6] Economic Development in Rural Alberta Plan, Government of Alberta: https://open.alberta.ca/dataset/b3cb4a52-e3fb-4aeb-a69f-0d32a5a14eec/resource/b4342f56-6762-4fdb-85c0-2856ae599d77/download/agi-economic-development-in-rural-alberta-plan.pdf?utm_source=chatgpt.com

BCG'S SUSTAINABILITY GOALS

01. SHORT TERM

- Expand local farmer partnerships for hemp growth by 50% within two years.
- Reduce internal manufacturing waste by 20% by 2026.
- Improve facility energy use by 20% by 2026.

02. MID TERM

- Launch a fully circular product line in the construction sector by 2027.
- Environmental Product Declaration complete by 2027
- Achieve a 30% reduction in transportation emissions by optimizing supply chain logistics.

03. LONG TERM

- Establish BCG as a carbon-neutral manufacturer by 2030.
- Develop new hemp-based applications for emerging industries such as renewable energy and aerospace.

BCG is committed to reporting our performance based on the goals identified above. We are in the process of identifying data points and accurate sources to support clear and transparent reporting.

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