**ALBERTA HUB BUSINESS OPPORTUNITY:**

**HEMP BASED BIOCOMPOSITES**

Biocomposites are materials formed by blending natural fibres with other natural or synthetic materials. The use of hemp as a feedstock, which has good growth potential in the Alberta HUB region, is an exciting opportunity. Hemp has been grown for industrial purposes for many decades. Whereas other regions have focused largely on hemp seed production, the Alberta HUB region is well suited to growing industrial hemp varieties suited to yield fibre and hurd of high quality and quantity.

### FEEDSTOCK

Hemp is currently grown in the Alberta HUB region and the growing conditions are favourable for straw intensive varieties. Industrial hemp is grown primarily for its seeds and fibres, or in some cases both. Straw from the hemp crop, which was largely considered as a waste product in the past, is currently used to produce hemp fibres, which is processed further and can be used in a variety of industries such as textile, bioplastics, and pulp and paper. It should be noted that the hemp straw consists of 15% to 30% fibre, 55% to 60% hurd (the woody core of the stem), and 15% to 25% is dust, which can possibly be pelletized and used as biofuel.

There are several hemp varieties, some with a significant biomass proportion growing 2 to 3 metres in height. Shorter varieties are easier to harvest for producers who only want seed. Seed is harvested later than dedicated fibre crops as it needs to mature longer. Specifically equipped combines can harvest the entire crop, so it is conceivable that both food and fibre could be grown in the same field to enhance producer netbacks, given an appropriate hemp variety.

### MARKET

**Growing Market:**

According to a new market report*, the future of the natural fiber composites (NFCs) market looks attractive with opportunities in the automotive and building and construction industries. The global natural fiber composites market is forecast to grow at a CAGR of 8.2% from 2015 to 2020. The major driver for the growth of this market is the rise in demand for lightweight and environmentally sustainable composite materials in various applications, such as automotive, building and construction, and others.

**So Many Uses:**

Hemp offers super absorbency. This quality is desirable for oil and gas cleanup, livestock bedding and personal hygiene markets. Hemp’s very high tensile strength, strength-to-weight ratio, flexural strength and ability to rebound are desired benefits in bio-composites for automotive parts, aerospace and packaging. The textile, paper and building markets have interest in some specialty applications due to hemp’s durability, antimicrobial, acoustic and aesthetic properties. There is growing demand in food markets for certified organic hemp production. Some 80% to 85% of Canadian grain production is exported, mainly to the United States.**

**And Strong:**

While pre-commercial, Just Biofibre Structural Solutions Corp. of Calgary has patented a hempcrete building block which is lower cost on an installed basis, stronger and has better acoustic and insulating properties than cement blocks. Just Biofibre uses the hemp hurd (the woody core of the stalk surrounded by the bast fibre) so is an excellent complement to Biocomposites Group’s demand for hemp fibre. Biocomposites Group is a manufacturer of high performance bio-fibre products. Its blocks provide an insulating value of between R27 and R42 for the same price or lower as conventional concrete blocks.

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*Eastern Alberta Trade Corridor - We Mean Business*
**New Opportunities:**

The Controlled Drugs & Substances Act regulation currently forces farmers to discard the leaves in the field, due to their low 0.3% THC content. This level is deemed to be above the limit wherein narcotic effects occur. The announcement updating this regulation to permit harvesting of leaves is expected in the future. This would open a significant new co-product revenue source for higher value foods, medicinal products, nutraceuticals, and animal feed. In January 2015, the US Industrial Hemp Farming Act of 2015 was introduced into the Senate, which would change the material's designation as a controlled substance and permit farmers in the US to produce industrial hemp.

** "Industrial Hemp Enterprise"; Published by Alberta Agriculture and Forestry, November 2015

**VALUE CHAIN & PRODUCTS**

Figure 1 above illustrates the numerous steps in the processing value chain and the resulting products. This value chain excludes leaves, which could also serve as feedstock for health, food, and animal feed products.

Active projects in Alberta include fibre mats for automotive interior panels and hempcrete construction blocks. Internationally, hemp is becoming a mainstream fibre in many domains. For example, Nike uses hemp fibres in its running shoes. There are several Canadian companies—including Hemp Oil Canada Inc., Hempola Valley Farms, Fresh Hemp Foods Ltd., Ruths Hemp Foods, Cool Hemp, and Natures Path, etc.—who are working to develop and market hemp seed products. These companies are all involved in the hemp seed market and are producing a wide range of products like snack foods, hemp meal and flour, edible oil, shampoo and conditioners, moisturizers, commercial oil paints, beer, aromatherapy, and cosmetic products.

Located in Vegreville, the Alberta HUB region has the only Pilot-Scale Decortication Facility in Alberta. It is North America’s largest research and development facility. This is the first process required in Industrial Hemp Fibre manufacturing.

InnoTech Alberta Facility Vegreville
TYPICAL CAPITAL & OPERATING COSTS

With ready access to feedstock and a cluster to reduce capital and operating costs, this opportunity could likely be competitive in nature if supported by both fibre mat and hempcrete customers:

• A standalone dry decortication unit with a straw processing capacity of 4 to 7 MT/h, would cost approximately $8M to $10M. The outputs of this plant would be bast fibres, clean hurd, and dust in bulk.

• The prices of processed fibre and hurd range between $370 and $1,000/tonne respectfully to the manufacturer.

• It is estimated that a 3 MT/h plant, the operating costs were $5.5M, of which one half was feedstock.

• Given yields of 30% fibre and 55% hurd, the maximum annual fibre production from a 3 tonnes/h decortication plant running 24 hours per day for 350 days per year would be about 6,300 tonnes of fibre and 13,800 tonnes of hurd.

• It is estimated that the demand for hemp fibre for automotive interior manufacturing in Alberta will be between 2,000 and 6,000 tonnes per annum (Biocomposites Group). At an average price of $1,000/tonne for processed fibre, the total fibre revenue for a decorticator selling into an automotive panel manufacturer in Alberta would be $2M to $6M.

• A full scale hempcrete building block plan would consume 16,000 tonnes of hurd annually. Thus, at a price of $370/tonne, a decorticator could earn an additional $5.9M.

March 2012 – “Alberta Hemp Cost of Production & Market Assessment”: Alberta Agriculture and Rural Development

HEMP PROCESSING ALREADY IN THE ALBERTA HUB REGION

InnoTech Alberta (formerly AITF) Vegreville decortication facility has made it possible for an Alberta company to conduct successful pilot programs with automotive parts manufacturers for hemp reinforced automotive interior panels. Each panel within a single car model would generate approximately $2 million in sales.

Given the large reduction in mass of fibre versus the entire hemp plant, it is advantageous to have decortication facilities close to the field. There may be an opportunity for up to 4 new decortication facilities in Northeast Alberta, should this market opportunity fully emerge.

TRANSPORTATION CAPACITY IN ALBERTA HUB REGION

The Alberta HUB region has an excellent transportation system for moving agriculture products provincially, nationally and internationally. Highways 41 and 36 are high load corridors running north-south to U.S. and Mexican markets. Highway 16 is part of the Yellowhead branch of the Trans-Canada Highway system that connects the Alberta HUB region to the strategic ports of Prince Rupert and Vancouver in British Columbia. Alberta HUB’s highway system is complimented by CN and CP rail lines as well as a number of regional airports.
The adjacent map highlights the region’s transportation system, including processing facilities. While this document focuses on hemp hurd and fibre, the harvesting of seed must also be considered, therefore, seed cleaning plants are also included on the map.

CN and CP both run in the Alberta HUB. CN also operates a 268,000lb line running through Lac La Biche and Thorhild County connecting Northern Alberta to international markets. CN also operates a 268,000lb line through Lac La Biche to Fort McMurray.

Some major agri-based companies operating in the Alberta HUB region include: Buhler Industries in Vegreville, Highland Feeders in Two Hills County, one of the largest cattle feedlots in Canada. Richardson Pioneer, Cargill and Viterra have numerous locations in the Alberta HUB region.

### PLENTIFUL ELECTRICITY

The two major lines servicing the Alberta HUB region are from ATCO electric. The line from the Cold Lake plant is 115 to 229 KV and the line from the Bonnyville plant is <115 KV. Also, the Foster Creek Cogeneration in the Bonnyville area has a natural gas feedstock and a capacity of 80 megawatts. The power plant in the Cold Lake region (operated by Imperial Oil), which has a 168 megawatts capacity, would serve the Alberta HUB region. Currently, the Bonnyville plant is operating below capacity at 68 MW and the Cold Lake plant is at full capacity.