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Industrial Hemp Association of Queensland Inc.

www.ihaq.com.au

Business Case for

Carbon Soil Sequestration & Industrial Hemp Production

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1 Executive Summary

1.1 Recommendations

Because of its unique properties for carbon bio-sequestration, as an export food crop in times of uncertainty to world food security, and as a contributor to eco-friendly building materials science and bio energy, it is clear that fast growing industrial hemp is a major asset in the fight against climate change.

In view of the Australian Government's, proposed Carbon Farming Initiative, the **Industrial Hemp Association of Queensland Inc (I.H.A.Q)**. recommends that Australia's industrial hemp primary producers are given every support and assistance to work through the process of being able to claim carbon credits from the scheme, to be operational in mid-2011.

As carbon credits under the AGCFI is based on following a methodology yet to be published, reciprocal support and assistance is required from industrial hemp producers to ensure that its production has a simple ,easy to use mechanism for farmers to claim carbon credits under the proposed scheme . .

1.2 Rationale

The UN Intergovernmental Panel on Climate Change 2007 Fourth Assessment Report makes the following recommendation for the short-medium term mitigation strategy for the agriculture industry:-
"Improved crop and grazing land management to increase soil carbon storage; restoration of cultivated peaty soils and degraded lands".

To reduce our carbon footprint, we have to rapidly increase the ability of the air, oceans, and land to absorb carbon.

Soils represent a short to long term carbon storage medium, and contain more carbon than all terrestrial vegetation and the atmosphere combined. Methods that significantly enhance carbon sequestration in soil include no till farming, residue mulching, cover cropping and crop rotation ,all of which are used in organic farming practice more than in conventional farming .

High carbon soil enhancements in the form of Biochar and Fulvic Acid are useful anthropogenic solutions to carbon sequestering mechanisms and are being investigated.

1.3 Agribusiness and Emissions Reduction

The essential points for effective land use for agriculture in Australia are -

Australia has a very large land mass, and consequently has enormous potential for bio-sequestration, providing positive absorption of greenhouse gases, not just industrial CO2 emissions reduction, therefore able to generate substantial carbon credits from this sector.

Australian agribusiness is therefore a key player, with a substantial part of the solution for global greenhouse gas reduction, by effective use of the continent's arable land - Australia may have a comparatively low carbon footprint due to low population, but it has the potential to contribute to reduction of the world's CO2 with appropriate farming practices.

Australian agribusiness has the potential to provide a clean, green engine of economic growth, given the international situation of threatened world food security, rising food prices, land shortages for agriculture, due to over-population during the next few decades of transformation of the industrial landscape toward carbon neutrality.

1.4 Hemp Carbon Removal

Industrial hemp is not only a low CO2 crop that can be grown for food and non-food purposes, it also has the capacity to accelerate carbon sequestration in the soil, thus forming a natural carbon sink in land that could otherwise be responsible for increased emissions through soil imbalance. Once sown, it has unique properties for eradicating weeds and stabilising soil erosion - “Hemp offers some real environmental advantages, particularly with regard to the limited needs for herbicides and pesticides. Hemp is therefore pre-adapted to organic agriculture, and accordingly to the growing market for products associated with environmentally-friendly sustainable production.” - Trends in New Crops and New Uses, Purdue University ISBN09-970756-5-5 Edited by Jules Janick and Anna Whipkey.

Hemp is a crop that has been used since ancient times for sails, ropes, nets, clothing, canvas, paper, food and building. In contemporary times hemp agricultural production can be readily geared to respond to any fast track establishment of low-carbon environmental technologies and industries. The low density and highly crystalline cellulose content of the hemp natural fibre leads to the excellent specific properties ideally suited to bio-fibre composite and bio-polymer technologies.

Although there is little in the way of comparative study of biomass growth rates amongst trees, plants and crops, hemp is one of the faster growing bio-masses, producing up to 25 tonnes of dry matter per hectare per year. It can be produced organically, and its products are biodegradable. Hemp leaf is 50% nitrogen, enabling it to enrich soil rather than deplete it. In ages past, hemp has been grown with crop rotation required only after a number of years.

Hemp is capable of enhanced carbon removal because of its properties such as the ability to

- Provide temporary cover between planting seasons
- Cover bare paddocks with vegetation .This protects soil from the sun and allows the soil to hold more water and be more attractive to carbon-capturing microbes.
- Restore degraded land, which slows carbon release while returning the land to agriculture or other use

It is perfectly suited to large scale agribusiness, providing not only income to farmers, but also photosynthesis of CO2 from the earth's atmosphere. This produces organic compounds in the hemp crop, as well as in the soil in which the crop is grown.

1.5 International Market for Hemp

The growth in world demand for food, fibre and value added products, services and technologies is of such a scale that primary industry production in Australia could double in the next 25 years. There is a growing international market for hemp building materials and insulation, hemp food products, fibre for hemp textiles and hemp plastic and automotive composites.

A conservative estimate of the total retail value of hemp products sold in the United States in 2007 is $350 Million. - Industrial Hemp Profile – Ray Hansen, Iowa State University

1.6 Australian Agribusiness Opportunity

There is a unique opportunity to be at the forefront of a growing agribusiness sector that can provide an abundance of CO2 bio-sequestration in a short timeframe, earning farmers income, while addressing global CO2 imbalances. It is essential that carbon credits under the Australian Carbon Farming Initiative is made readily accessible to hemp producers. http://www.daff.gov.au/climatechange/cfi

2 CO2 Emissions Business Problem

Global warming is mainly the result of CO2 levels rising in the Earth’s atmosphere. Both atmospheric CO2 and climate change are accelerating. Climate scientists say we have years, not decades, to stabilise CO2 and other greenhouse gases.

The current level, and rising rapidly, (measured March 2011) is 391.76 ppm. A sustainable level is 350 ppm according to a paper published by James Hansen of NASA Goddard Institute for Space Studies - (Hansen, J., Mki. Sato, P. Kharecha, D. Beerling, R. Berner, V. Masson-Delmotte, M. Pagani, M. Raymo, D.L. Royer, and J.C. Zachos, 2008: Target atmospheric CO2: Where should humanity aim?)

The business problem facing the local, national and global economic community is threefold. As the level of greenhouse gases climb increasingly rapidly towards the climate tipping point, every society has to face these problems.

- Mitigation of risks posed by rising greenhouse gas levels
- Adaptation to the changing circumstances of depleted soils, species loss, rising sea levels, acidification of oceans, degradation of arable lands.
- Transformation of business-as-usual to sustainability beginning in the short-term, and accelerating in the medium-term.

Of the total of humanity's carbon emissions, 47% goes into the atmosphere, 27% goes into the land, and 26% goes into the oceans.

Carbon emissions reduction is the answer for the air and ocean's; however agribusiness has the capacity to make a positive effect on the carbon absorption properties of the land by agricultural and horticultural practices.

The Garnaut Climate Change Review points out that the costs of mitigation in rural Australia are moderate if implemented efficiently, but high if implemented crudely. The agriculture, forestry and other land use sectors contributed around 20% of total annual emissions in Australia's most recent Kyoto accounts (Kyoto accounts DCCEE 2010a).

Once established, the Australian Government Carbon Farming Initiative is to provide ready access to carbon credits for carbon bio-sequestration (storing carbon in the soil) as well as carbon emissions reductions. The carbon accounting from this scheme will no doubt be improved, simplified and integrated with the Australian carbon pricing mechanism over the next few years.

2.1 Environmental Analysis

The current business environment can no longer afford to be change resistant, with long lead times for new enterprises and changing practices. Innovation can no longer be stifled, bought out and shelved, disregarded and denied.

A price on carbon is changing the industrial and energy landscapes, and renewable energy is on the roadmap of all major economies in both the developed and developing worlds.

Past practices of the natural environment not considered, not understood, and destroyed as collateral damage with no value by a business culture can no longer be supported.

Planet earth has a large number of natural mechanisms for keeping the carbon/oxygen/nitrogen levels in the atmosphere, oceans and soils in balance. These mechanisms have to be understood, and supported by investment in new economic activities, for a chance to limit the effects of climate change to manageable levels.

Agribusiness standards and metrics are required for land use that will not only be sustainable, but also must provide a level of CO2 absorption that can be measured, and used as the basis for earning carbon credits in the carbon marketplace. It is expected that a standard is to emerge from the Australian Government Carbon Farming initiative.

2.2 Agribusiness Opportunity

There is a prime opportunity to directly address the removal of CO2 from earth's atmosphere with facilitation of large-scale industrial hemp farming in land that has become eroded due to increased flooding, or that is depleted due to poor crop rotation and neglect of soil restoration.

The requirement for reduction in soil erosion, degradation, and plantings to absorb CO2 from the atmosphere is urgent. Incentive has to be found for farmers nation-wide to plant appropriate restorative crops.

Research,Production and Development

Worldwide research and development has sparked an increase in new, innovative uses for hemp. Over 30 countries have continued to grow and process industrial hemp. World leaders of hemp production include China, Canada, Germany, England, France and Romania. From the United Nations Food and Agriculture Organization statistics, world hemp fibre production increased from 78,000 Mt in 1995 to 107,000 Mt in 2001. The UK price /tonne was AUD$450 in the early years of the new millennium.

China

China currently cultivates industrial hemp over an area of around 20 000 hectares. China's Hemp Research Centre in Beijing has an open ended target for 1.3 million hectares of the country's farmland to be dedicated industrial hemp cultivation, or around two million tonnes of hemp fibre.

Hemp has been grown in China for the past four thousand years, and up till last century when it was overtaken by cotton, it was the major fibre crop produced. Chinese science has focused on improving the production of textiles from hemp, in its huge textile and clothing export businesses.

China's first commercial-scale hemp processing mill, in Xishuangbana, Yunnan Province, has the capacity to process 50,000 tonnes of hemp fibres a year, mainly for use in cotton-hemp blends.

Zhang Jianchun, Director General of China's Hemp Research Centre, has been quoted as saying " hemp agriculture can play an important role in guaranteeing China's food security, protecting the environment and contributing to farmers' incomes'' (because of its qualities of being able to grow in semi-arid regions, and in regions of poor soil quality). See "Fibre Stories - Hemp's future in Chinese fabrics"- http://www.naturalfibres2009.org/en/stories/hemp.html

Building Material

Hemp has been subject to construction industry development and testing since the 1970s. Unlike tree fibre, where lignin is extracted from forestry products with chlorine, hemp building products does not create dioxins in removal of lignin.

Medium density fibreboard can be produced in the same machines that currently produce timber based products. As hemp fibres are much longer than fir or other timbers used in particle boards, with new production processes, hemp has the capacity to be used for structural building beams, (as the science of composites finds that the strength of a product is directly proportional to fibre length).

The hemp value stream of end use products for the construction industry includes bio-composite fibre technology for multi-purpose building boards, compressed panels, eco-concretes, living cements, natural renders, eco-blocks, insulation and low voc paints.

Food

To introduce hemp food products and processing (cold pressing, etc), the infrastructure already exists, so there is a ready-made viable industry to allow further investment in the more costly processing methods for different products.

Hemp seed and oil products provide the following uses:

- Foodstuffs (protein ,flour ,bread, milk, butter, cheese, ice cream ,vitamin supplements, health and natural foods etc), pet foods, livestock feed, cooking and edible oils.

In the 1990's, an agricultural research project for the development of hemp food products and processes was undertaken by the Canadian government. In March 1998 Health Canada re-legalized the cultivation of Industrial Hemp in Canada. Close to 180 farmers are currently taking advantage of the market for hemp foods with 19,500 H/A (2006) under cultivation with an estimated retail value of $US40 Million for hemp seed products alone.

Whole hemp seed is composed of approximately 45% oil, 35% protein and 10% carbohydrates and fibre. According to Agriculture and Agri-Food Canada, hemp seed (and its byproducts) can be used to supplement diets poor in essential fatty acids (EFAs) to maintain good health. Hemp is one of only two plants that contain both EFAs (Omega 3 & Omega 6) as well as Omega 6 gamma linolenic acid (GLA). GLA has been found to have many properties ranging from anti-inflammatory to anti-depression.

3 Appendix - Supporting Documentation

1. Carbon Farming Initiative - http://www.daff.gov.au/climatechange/cfi
2. Climate Change: Science and Solutions for Australia – CSIRO http://www.csiro.au/resources/Climate-Change-Book.html
3. Industrial Hemp Information Paper – Qld Department Primary Industries http://www.agric.wa.gov.au/objtwr/imported_assets/aboutus/as/information_paper_2008.pdf
4. Ross Garnaut Climate Change Review update Paper 4. - Transforming Rural Land Use http://www.garnautreview.org.au/
5. The US Hemp Market: An economic examination of the hemp industry. Richard A. Adams.
6. Baker College Center for Graduate Studies http://www.druglibrary.org/schaffer/hemp/indust/ECNPAPER.html
7. Industrial Hemp: Global Markets and Prices Valerie L. Vantreese Revised June 1997
8. Hemp Oil Canada(www.hempoilcan.com) Andrea Hermann
9. Conde & Seber July 1994: Building Toward the Future with Hemp
10. Hempseed Foods – Richard Rose, The Hemp Food Association.

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