

The Need

From development of the Alberta oil sands, to support for off shore oil discovery in eastern Canada, the government has played a central role in supporting emerging industries that have ensured discoveries and opportunities occur in Canada and contribute to Canadian's standard of living and quality of life. A sustainable domestic biodiesel industry offers similar potential, but government action is required to ensure the potential is realized.

Policy Changes are Required

The government has stated a goal of 5% renewable content in fuels nationally. Assuming biodiesel would replace 5% of the current consumption of diesel, this would require the production of just over 1.5 billion litres biodiesel²². The canola industry is confident it can supply over 80% or 1.3 billion litres of the required feedstock by 2015, with the remainder coming from other vegetable oils, animal fats and recycled restaurant grease. Experience in other countries indicates this goal can be met, but only if policy changes at the federal and provincial levels occur²³. Investments at the 'front end' of this emerging industry would signal long-term sustainability, while ensuring Canada participates in the value-added processing associated with biodiesel rather than simply supplying the raw products. Government action is required to support the development of a sustainable domestic processing base and market in all of the following ways:

Staged implementation

A 5% biodiesel blend (B5) would translate into almost approximately one-fifth of canola's projected production in 2015 being used for biodiesel production. Given the time lag required to bring production facilities on line, careful consideration should be given to the introduction of a phased-in mandate. An initial mandated 2% biodiesel inclusion level in 2010, rising to a 5% inclusion level by 2015, would provide a strong investment signal to the marketplace and to feedstock suppliers that a domestic biodiesel industry is sustainable.

Policy incentives

The current set of incentives and other forms of government support in the United States (US) including the accelerated depreciation of capital assets directly related to the production of biodiesel, refundable tax credits and producer incentives have created an investment climate that favours the establishment of biodiesel production infrastructure in the US that will use Canadian canola as the feedstock to supply domestic as well as potential export market demand²⁴. Canadian policymakers need to address this inequity by encouraging investments in a robust domestic industrial base in canola producing areas. Investments in domestic infrastructure will not only sustain the biodiesel industry but could also provide an important platform for

increased research and development activities in clean fuel technologies in Canada.

Mandated biodiesel quality parameters

A sustainable biodiesel industry requires the confidence of fuel suppliers, original equipment manufacturers and the transportation industry. This confidence can be gained and maintained by mandating quality parameters for biodiesel that address product quality as well as the realities of the Canadian climate. The canola industry already requires adherence to stringent quality standards for the production of seed and oil²⁵.

The importance of requiring standards in place prior to production is demonstrated by the recent experience in Minnesota, where fuel quality issues resulted in the production of biodiesel that did not meet the specifications for cold weather use. This led to a temporary suspension of Minnesota's B2 mandate and calls for enhanced quality control measures²⁶. While the process of developing a Canadian standard for biodiesel quality is ongoing, existing models, including the most current version of the ASTM D 6751 standard for biodiesel, provide a framework that has supported biodiesel innovation in other countries. Experience with biodiesel in climates similar to Canada demonstrates the need for additional quality parameters relating to cold flow and oxidative stability²⁷.

Truly Innovative Participation in the Value Chain

A canola-based biodiesel industry would provide innovative opportunities for farmer participation in the value chain. Active engagement of the farming community through support for farmer equity investments would also ensure the sustainability of the foundation supply required for the establishment of production facilities.

In addition to the direct impact in western Canada, the expansion of canola demand provides a substantial benefit across Canadian society, including Canadian Gross Domestic Product²⁸.

Every \$100 million* in additional demand for canola generates²⁸:

- 730 direct jobs in value added industries
- \$83 million in GDP
- \$5.2 million in tax revenue (federal, provincial)

*450,000 tonnes at current cash prices (\$222 per tonne)

²⁶ National Biodiesel Board "Biodiesel Leaders Request Enhanced Quality Control Measures in Minnesota" 2006

²⁷ UFOP "Biodiesel Facts, Arguments, Tips" 2003

²⁸ M Goodwin Consulting Ltd, "Canola Socio-Economic Value Report", 2006



from Farm to Fuel

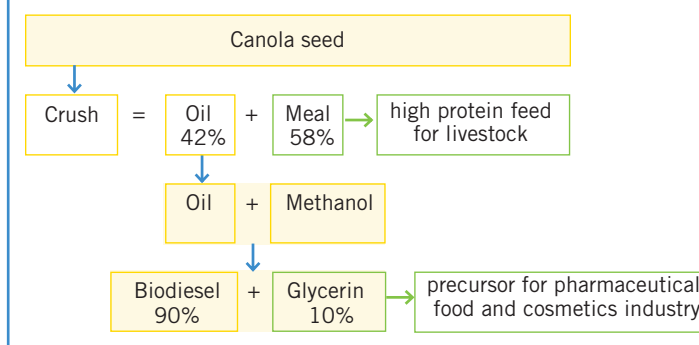
The Impact of a Canola-based Biodiesel Industry in Canada

The Opportunity

Proven Technology

Biodiesel is a proven, renewable and clean-burning fuel source that is supplying an increasing amount of energy in the countries of the European Union (EU) and the United States (US)¹. Biodiesel is produced from oilseeds like canola through the process of *transesterification*. Canola seed is crushed and the resulting oil is reacted with an alcohol like methanol in the presence of a catalyst to produce approximately 90% biodiesel and 10% glycerin. The glycerin by-product is available for use as a raw material in the cosmetic and pharmaceuticals industry.

From Field to Fuel—Year after Year...



Foundation supply

Biodiesel can be produced from a variety of feedstocks, including vegetable oils, animal fats and recycled restaurant grease. A Canadian-based biodiesel industry will be able to source feedstock from all three, but biodiesel producers are seeking to include high levels of canola because of its quality standards and unique characteristics including:

- High oil content—means more oil is available per unit of seed processed
- Low levels of saturated fat—low levels mean improved cold weather performance
- Low iodine values—resulting in fewer engine deposits

In 2002, the canola industry set a target of 7 million tonnes of production; this level was exceeded in 2004. Production in the 2005–2006 crop year was a record 9.66 million tonnes. The canola industry is confident that by 2015, production will exceed 14 million tonnes—5.0 million tonnes for food use, 6.5 million tonnes to meet export requirements and 2.5 million tonnes for biodiesel—enough to supply 1.3 billion litres of canola oil.²

This increase will be met by improvements in technological advances in the yield and oil content of canola varieties and the expansion of acreage into non-traditional production areas as a result of the development of better-adapted varieties. This expectation of production increases is supported by experiences in other jurisdictions, including Germany³, where increases in feedstocks advanced with the market development of biodiesel, and through experience with yield increases due to adoption of higher yielding, better adapted hybrid varieties in crops like corn and rice⁴.

Made In Canada Opportunity for a Made In Canada Crop

Over 40 years ago, Canadians seized the opportunity to build a new industry with the development of canola. Today, canola contributes over \$11 billion in economic activity to the Canadian economy⁵. The technological advances in canola, however, require new markets to ensure production growth is sustained. The emergence of a domestic biodiesel industry would send a strong new demand signal to the canola industry. However, this demand signal alone is not sufficient to generate the investments in Canadian based facilities. In response to support programs at the local, state and federal levels in the US, production capacity is expanding rapidly. Investments are being made in the United States that will use Canadian canola as the preferred feedstock. In order to ensure that the Canadian demand for biodiesel is not met by importing biodiesel from the US, policy incentives that support a "made in Canada" supply and maintain a competitive balance across North America are required.

²² Canadian Bioenergy Corporation, "Developing a Canadian Biodiesel Industry" 2005

²³ (S&T)² Consultants Inc "Economic, Financial, Social Analysis and Public Policies for Biodiesel, 2004

²⁴ (S&T)² Consultants Inc "Economic, Financial, Social Analysis and Public Policies for Biodiesel, 2004

²⁵ CAN/CGSB 32.300-M87

¹ Promar International "Evaluation and Analysis of Vegetable Oil Markets", 2005

² Canola Council of Canada, personal communication 2006

³ UFOP "Biofuel in Europe: Situation and Outlook" 2005

⁴ Harlan, JR "Crops and Man" 1975

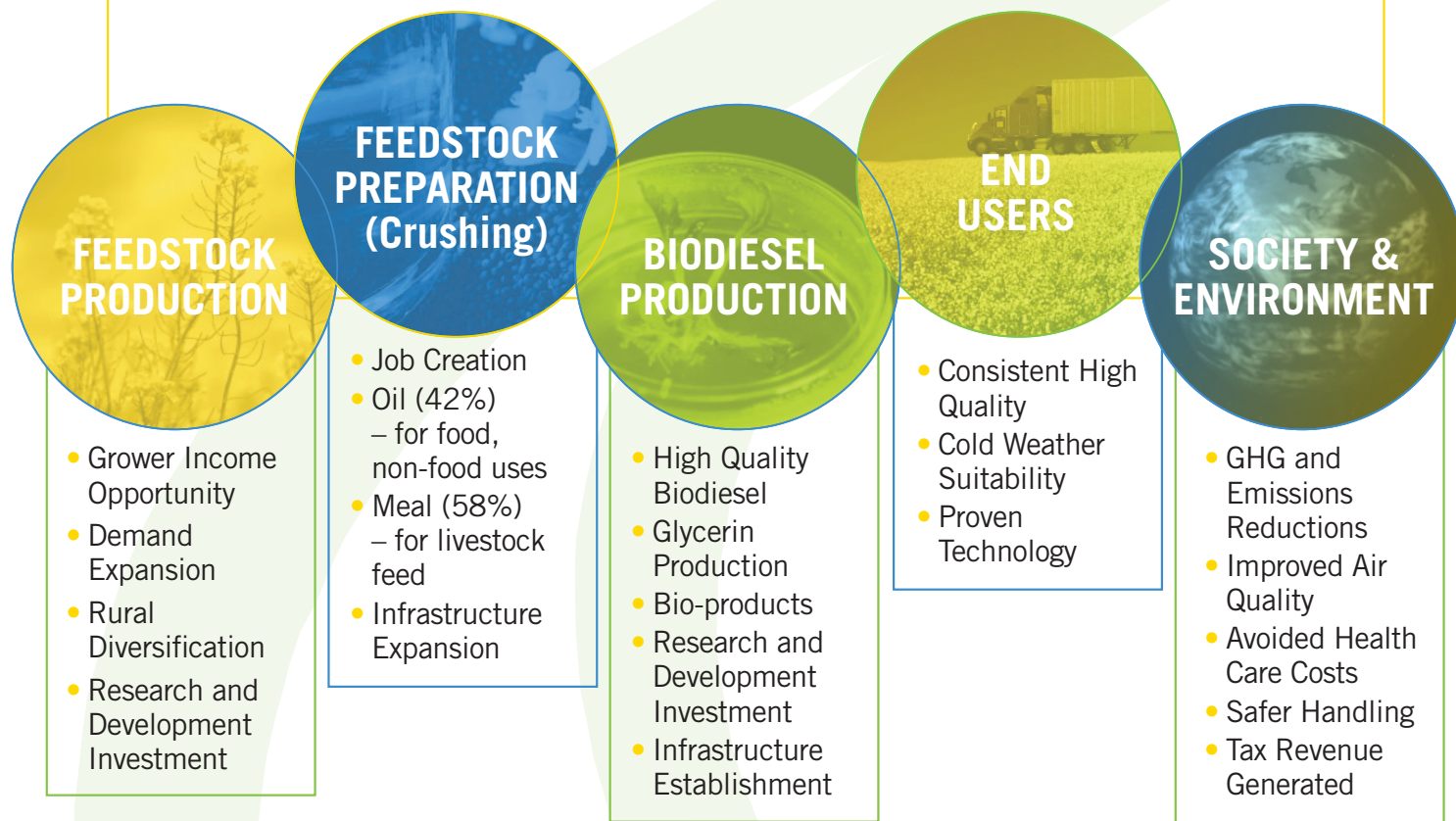
⁵ M Goodwin Consulting Ltd, "Canola Socio-Economic Value Report", 2006

⁶ www.admworld.com "Archer Daniels Midland Announces Plans to Build Biodiesel Production Facility", 2005

⁷ Grant County Economic Development Council "Legislation allocates \$2.5 million for Port of Warden Biodiesel Project", 2006

Economic Impacts

A 1.5 billion-litre biodiesel market with Canadian canola as the foundation feedstock has positive impacts along the value chain.



Direct Economic Impact

Current production and market demand for canola have traditionally resulted in significant carryovers (stocks left over after all market commitments have been made). The canola industry believes a carryover level of 1 million tonnes is necessary for stability and confidence in the processing sector. Since the 2004–2005 crop year, however, carryover levels have been in excess of the desired 1 million tonnes, which has the effect of depressing prices. If domestic production facilities were in place, using 1 million tonnes of carryover canola seed for biodiesel production instead of having it remain unsold could have supplied over 500 million litres of biodiesel, which would have resulted in over \$200 million in additional gross farm revenue, 500 new jobs in the biodiesel industry, capital expenditures of over \$165 million and annual operating revenues in excess of 1.8 billion⁸. As production facilities for biodiesel would locate in close proximity to the feedstock, the majority of the economic benefit would have occurred in western Canada.

The positive impact of a canola-based biodiesel industry would be seen quickly. A 100+ million-litre biodiesel facility can be constructed within 18–24 months and studies

indicate every investment of \$1 in biodiesel infrastructure returns \$2 of economic activity in construction and supporting industries. The return on investment in biodiesel is sensitive to the price of diesel fuel, which is directly impacted by the price of crude oil. According to estimates by Promar International, the world price of crude oil will remain above US\$40.00 per barrel (\$ per litre) until 2030, which is the threshold for biodiesel profitability⁹.

Value Added Benefits

Sustainable, predictable supplies of biodiesel production co-products also provide opportunities for additional economic activity. The meal from crushing the canola is a high protein livestock feed that can replace more expensive imported protein meal in dairy and hog rations¹⁰. The glycerin produced during the transesterification process is a precursor in food and beverage, cosmetic and pharmaceutical processes¹¹.

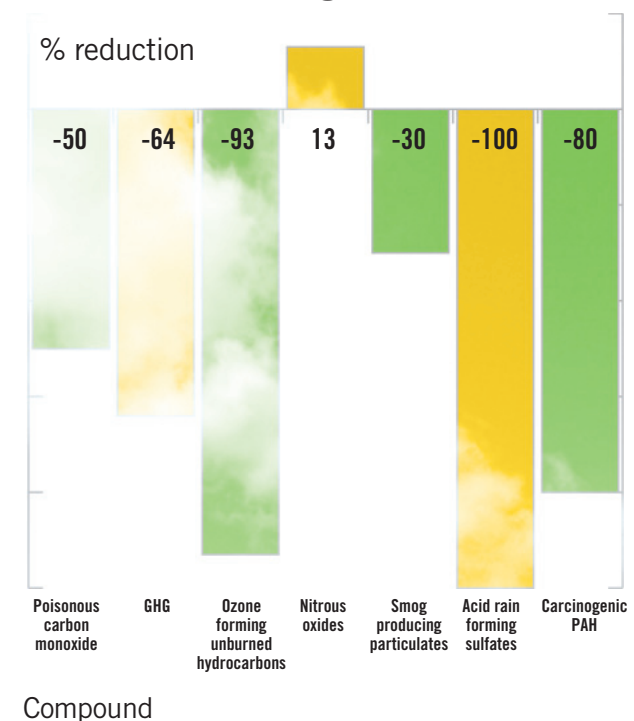
New domestic markets for canola would also foster additional investments in research and development activities in other industrial uses. Canola-based products are gaining notice from industry and consumers because they are environmentally friendlier, less of a human health hazard,

and superior in performance to many products currently on the market. With the Canola Council of Canada forecasting canola production to increase to 14 million tonnes by 2015, other market opportunities for environmentally friendly chemicals derived from canola oil may emerge including lubricating oils, diesel fuel additives, plastics and plasticizers, adhesives, agrochemicals, solvents and paint strippers, surfactants and other industrial chemicals.

Quality of Life Impacts

A biodegradable and renewable fuel, biodiesel has impressive human health and quality of life attributes.

Using 1.5 billion litres of biodiesel will improve air quality by reducing harmful emissions including Greenhouse Gases¹²



Air Quality

Use of biodiesel can help improve urban air quality by significantly reducing emissions of sulfur dioxide, carbon monoxide and particulate matter¹². By reducing emissions, biodiesel may help offset the health risk associated with the inhalation of air pollutants found in diesel exhaust. Using biodiesel instead of conventional diesel would reduce emissions of poisonous carbon monoxide, ozone forming hydrocarbons, hazardous diesel particulates and acid rain causing sulfates. Biodiesel is essentially free of polycyclic aromatic hydrocarbons (PAH), a group of compounds linked to lung, stomach and skin cancers that are formed during the incomplete burning of fuels including conventional diesel¹³.

Water Quality

Biodiesel is highly biodegradable, making it an environmentally sound choice for preservation of water quality¹⁴. Biodiesel biodegrades four times faster and to a greater extent than conventional diesel. The degradation rate of petroleum diesel is tripled when blended with biodiesel. The environmentally favourable quality of biodiesel is leading to growing interest in its use at port facilities in densely populated regions. In addition to biodegradation properties, the use of biodiesel and biodiesel blends results in a reduction in exhaust odour and easier boat cleanup due to production of less particulate matter or 'soot'. Washington State Ferries, the largest ferry system in the US, has committed to using biodiesel as a major tool in its commitment to reduce air pollution in the Puget Sound¹⁵.

Greenhouse Gas Emission Reduction

The transportation sector represents an ever-increasing source of Greenhouse Gas (GHG) emissions in Canada. Forecasts are for emissions from transportation would exceed 1990 levels by 40% in 2020¹⁶. The accelerated use of biofuels such as biodiesel is seen as one way to reduce the GHG emissions of this sector.

Of the six greenhouse gases of most concern, carbon dioxide is deemed to be the most important one released by human activities because of the large quantities produced through the burning of fossil fuels. Canola biodiesel provides a 'made-in-Canada' solution that may help reduce the net amount of carbon dioxide in the biosphere. Biodiesel production and use produces 78% less carbon dioxide emissions than petroleum diesel, in part due to the 'carbon recycling' of the carbon dioxide used during production of the canola seed¹⁷. In addition to helping reduce carbon dioxide levels, biodiesel made from oilseed rape supplies three times the energy expended in its manufacture¹⁸.

While higher levels of nitrous oxides are emitted with biodiesel as compared to conventional diesel, research with fuel additives shows promise for reducing these emissions¹⁹.

Safe Alternative

In comparison to other fuels, biodiesel is safer to store and handle. At 260 degrees F, the flash point (the temperature at which the fuel vapour can ignite) for biodiesel is well above the flash point for conventional diesel (125 degrees F). The lower the flash point, the easier it is to ignite the material. The flash point of biodiesel blends also increases as the percentage of biodiesel increases²⁰.

Lower Health Care Costs

Use of biodiesel can be an instrument for lowering health care costs. A study in California found that using 1.5 billion litres of biodiesel would result in over \$400 million in 'avoided health care costs' per year as a result of improved air quality that results from reduced emissions of smog precursors like unburned hydrocarbons²¹.

⁸ Canadian Bioenergy Corporation, "Developing a Canadian Biodiesel Industry" 2005

⁹ Promar International "Evaluation and Analysis of Vegetable Oil Markets", 2005

¹⁰ Canola Council of Canada "Canola meal background and market" 2006

¹¹ National Biodiesel Board "Biodiesel basics" 2006

¹² Hogan, NR Canada "Biodiesel Basics" 2005

¹³ ATSDR "ToxFAQ's for polycyclic aromatic hydrocarbons (PAH)" 1996

¹⁴ National Biodiesel Board "Environment and Safety Information" 2006

¹⁵ Washington State Department of Transportation "Clear Sailing Ahead" 2004

¹⁶ (S&T) Consultants Inc "Economic, Financial, Social Analysis and Public Policies for Biodiesel, 2004

¹⁷ http://www.eere.energy.gov/afdc/altfuel/bio_benefits.html

¹⁸ UFOP "Biodiesel Facts, Arguments, Tips" 2003

¹⁹ National Biodiesel Board "Study shows NOx emissions reductions in biodiesel blends with additive" 2004

²⁰ National Biodiesel Board "National Low Blend FAQ" 2006

²¹ After California Air Resources Board, 2000 "The Carl Moyer Advisory Board Report" using a 86 cent Canadian dollar