

Biodiesel in British Columbia Feasibility Study Report

Executive Summary

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EXECUTIVE SUMMARY

This report has been produced so as to provide relevant information to anyone who is exploring the potential to develop a commercially viable biodiesel business in British Columbia.

Biodiesel is a safe, non-toxic, biodegradable, renewable fuel that can be easily used in unmodified diesel engines, and a variety of other fuel applications. It is not a new fuel; when Dr Rudolf Diesel developed his diesel engine in 1912, he designed it to run on peanut oil.

Since its first production on a commercial scale in Germany, in 1991, global production has increased rapidly. Biodiesel is now the fastest growing alternative fuel in Europe. In 2003, Germany, France, Austria and Italy produced over two billion litres of biodiesel, and in Germany and Austria, around 1700 service stations now sell biodiesel. Many European car manufacturers, including VW and Mercedes Benz, have approved biodiesel use for their engines. In Germany, over 19,000 jobs have been generated growing the feedstock, processing the raw materials, and marketing the resulting biodiesel. Two German bus companies run their entire fleets on biodiesel, and most major bus networks in France run on biodiesel blends.

In the U.S., a blend of 20% biodiesel with 80% petro-diesel (referred to as B20) is quite widely used, and 15 states have passed legislation favourable to biodiesel. In North Dakota and Minnesota, all diesel fuel is required to include 2% biodiesel. In Washington State, the Intercity Transit Authority uses a B20 biodiesel mix in its entire fleet, and is moving to B40 in 2004. In 2003, there were 123 gas service stations offering biodiesel. Almost all of the biodiesel that is used in Europe and the US comes from agricultural crops grown specifically for this purpose.

In Canada, biodiesel remains in the early stages of market development. Several bus companies are doing trials with imported biodiesel, and following trials, all 137 transit buses in Brampton, Ontario, are now using a B20 biodiesel blend. Canada's first and only biodiesel service station was opened by Topia Energy Inc in Toronto on March 2nd, 2004. Because of its practicality and its many environmental benefits, the federal government has established a target production rate of 500 million litres a year by 2010, under Canada's Climate Change Action Plan.

Biodiesel can be used either as a substitute for conventional diesel, or as an additive. In both its pure and blended forms, biodiesel reduces the emissions of air toxins, CO₂, particulate matter, carbon monoxide, hydrocarbons and black smoke from vehicles.

In its regular form, diesel exhaust contains more than 40 constituents which are listed by the U.S. Environmental Protection Agency as hazardous air pollutants or toxic air contaminants, and at least 21 that are listed by the State of California as known carcinogens or reproductive toxicants. 80% of the total cancer risk for all hazardous air pollutants is associated with the inhalation of diesel exhaust.

Compared to regular diesel, pure biodiesel (B100) can produce upwards of 73% reduction in lifecycle CO₂ emissions depending on the feedstock used, a 67% reduction in unburned hydrocarbons, a 48% reduction in carbon monoxide, a 47% reduction in particulate matter, a 100% reduction in sulphur oxide emissions, and an 80% reduction in polycyclic aromatic hydrocarbons, which can cause cancer and emphysema. Biodiesel's only downside is up to a 10% increase in nitrogen oxide emissions.

Biodiesel is produced by chemically reacting vegetable based oils, animal fats, or waste cooking oils with an alcohol (usually methanol), using either sodium or potassium hydroxide as a catalyst. The conversion results in pure/neat biodiesel (referred to as B100) with crude glycerine as an end product.

This report focuses on the potential to produce biodiesel from recycled bio-oils, rather than from virgin oils derived from agricultural seed crops, since B.C. has little available agricultural land. This approach

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provides a means of producing biodiesel in smaller urban communities across the province with more practical economics, and enhanced environmental benefits.

The biodiesel feedstocks that are examined in this report include recycled yellow and brown greases from restaurants and other foodservice establishments, fish oils from B.C.'s seafood processing industries, and rendered animal fats from the livestock industry.

Yellow grease, from recycled restaurant and food processing fryer oils, is typically the most consistent and economically viable raw feedstock that is available in most communities. It is currently being used by rendering companies for the manufacture of animal feeds. In this application, extensive processing is required to eliminate the risk of contamination in the final feed product. When yellow grease is used as a feedstock for biodiesel production, however, all that is required is filtering and de-watering.

An analysis of B.C.'s biodiesel feedstock volumes and transportation uses suggests the following market potentials:

- ❖ When all potential feedstock sources examined in this report are considered (including agricultural seed crops), they yield a total theoretical capacity for 125 million litres a year of biodiesel (B100), representing 4.5% of B.C.'s total diesel usage and 11.4% of the total on road diesel market. This represents a significant reduction in lifecycle greenhouse gases when compared to petroleum diesel.
- ❖ This is enough biodiesel to fuel 3,716 BC Transit buses using B100, or 18,580 buses using a B20 blend. It could also be used to fuel privately owned diesel vehicles
- ❖ If a 5% biodiesel mixture (B5) was used, blended with around 2.5 billion litres of low-sulfur petrodiesel, this would enable provincially produced biodiesel to be incorporated into B.C.'s the entire annual diesel supply.
- ❖ The potential supply of waste yellow grease from B.C.'s restaurants and food service establishments is estimated at 21.4 million litres a year. This is enough to provide a B100 biodiesel fuel for 636 BC Transit buses, or a B20 blended fuel for 3,180 buses.

While these estimates do not take account of the logistical and economic challenges involved in diverting available feedstocks towards biodiesel production and diesel fuel substitution, they do indicate the market potential, and the economic and environmental benefits that could be realized within the province.

In addition to analyzing biodiesel's potential feedstock characteristics, output volumes and environmental impacts, this report examines:

- ❖ The existing diesel fuel industry, and its environmental impact
- ❖ Current biodiesel activity in North America and around the world
- ❖ Biodiesel standards and regulatory issues
- ❖ An environmental comparison between biodiesel and regular diesel
- ❖ Biodiesel production technologies and processing options
- ❖ Potential markets and distribution channels
- ❖ Critical success factors for the development of a biodiesel business plan
- ❖ Recommendations to project developers and governments that will accelerate the development of the biodiesel market in B.C..

The report identifies four critical strategic factors that will drive the success or failure of a commercial biodiesel project. These are:

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- ❖ The ability to balance feedstock supplies, processing technology, and market penetration in an integrated system that is both reliable and efficient;
- ❖ The ability to form stable strategic alliances with feedstock suppliers, distributors, end users, and other stakeholders;
- ❖ The ability to anticipate and deal effectively with competitive pressures; and
- ❖ The ability to generate a business plan that will allow a project to attract financing, and maintain its financial health.

The report concludes that community-based biodiesel production at a plant scale of 4 million litres a year could be economically viable if regional sources of low-cost feedstocks are combined with high-value fuel markets, chiefly in the transportation sector.

Given the many environmental benefits, and the contribution that biodiesel can make to greenhouse gas reduction, government funding may also be considered, to close the gap in meeting financing challenges.

Project proponents are encouraged to:

- ❖ Update any time sensitive information, using sources referenced in the report combined with local market data, to complete a detailed feasibility study of the proposed project;
- ❖ Identify a low priced local feedstock that could support a local plant;
- ❖ Determine the capital and operating costs required to run a plant;
- ❖ Identify local fleet managers who may have the desire and the capability to run their fleets on a biodiesel blend.
- ❖ If a project appears viable, proponents are encouraged to prepare a full business plan, secure the required financing, and solidify contractual arrangements with suppliers and customers.

Recommendations to governments:

- ❖ In view of the many benefits to the economy and environment, the BC Provincial government should level the playing field for alternative fuels by removing the Transportation Fuel Tax for biodiesel, as it has already done for propane and natural gas. This is an essential move that will encourage the development of viable biodiesel projects in B.C..
- ❖ Both federal and provincial governments should provide additional incentives for alternative fuel substitution in all major fuel use categories, and financial support for the development of community-based alternative fuel programs.
- ❖ Provide leadership by mandating a minimum 1% biodiesel blend in diesel fuel.
- ❖ Provide leadership by running a biodiesel blend in government fleets.