



Freight Transportation Case Studies



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Hbc's Biodiesel Pilot Project

Organization

Hudson's Bay Company

Major Findings

The emissions reductions and performance of biodiesel exceeded expectations.

Timeline

August 2005 to August 2006

Please note that some figures such as cost savings on fuel are based on data from the period that this project took place.

Introduction

In 2005, the Hudson's Bay Company (Hbc) began a project to test the use of biodiesel fuel in a trucking application. This project was part of Hbc's Corporate Social Responsibility Program and was made possible by funding from Transport Canada's Freight Sustainability Demonstration Program.

Biodiesel is non-petroleum based, non-toxic, biodegradable fuel made from a variety of vegetable oils, or animal fats, such as recycled cooking grease. Although 100 % biodiesel fuel is available for particular applications, a 20% blend with normal diesel fuel can be used in diesel engines before modifications are required. This fuel is labelled as B20. Biodiesel was invented in the 1930s but its use has increased with the rising cost of diesel fuel, in tandem with the demand for greenhouse gas emissions reduction. B20 produces 12 to 18 % fewer greenhouse gas emissions than regular diesel fuel. As waste products can be used in the production of biodiesel, it also has the added benefit of reducing methane gas that would have been produced by the waste products in landfill sites.

Some grades of biodiesel can dissolve paint or degrade rubber engine parts, due to its solvent properties. It can also break down residue in fuel lines, resulting in clogged air filters from these deposits, but none of these issues have presented major obstacles to its adoption as an alternative to diesel fuel.

Project Description

Hbc partnered with Energy Advantage for energy and environmental management services that included assistance with this project.

The company has a fleet of over 200 long- and short-haul trucks that make runs from their facilities in Mississauga and Scarborough, to various locations around southern Ontario.

The proposal for this project was to use B20 in 12 dedicated freight trucks that would be used on their normal routes. The project results were to be measured against a control group of 12 trucks, also used on normal routes. The vehicles in both the test group and control group were of the same make and similar models, and all routes were within fuel tank capacity distance in southern Ontario. Canada Clean Fuels supplied the B20.

Hbc's primary objective was to reduce emissions from the transportation of retail goods, however, the project would also examine how the use of biodiesel would impact on fuel efficiency, engine wear, and maintenance costs.

Project Methodology

Fuel usage and distance traveled was measured by week, and by vehicle, using an Electronic Control Module (ECM). The volume of freight was documented in the company manifests. Weight was not included in collection of data, as the types of products they carry do not change, and there is little variation comparing seasons, year-over-year.

An electronic data logger recorded over-revving, speeding, and idling times. AGAT laboratories analyzed the engine oil. The purpose was to test the oil for metals, as indications of excessive engine wear. Further data collection included driver surveys, and weather station records to assess performance in cold weather.

Emission factors for carbon dioxide from diesel were taken from Environment Canada's National Greenhouse Gas Inventory. Emission factors for biodiesel were taken from the US Environmental Protection Agency reports.

Results

The emissions reductions are summarized in the table below.

Emission	Carbon Dioxide (CO ₂)	Total Particulate Matter (TPM)	Sulphur Dioxide (SO ₂)	Nitrogen Oxides (NO _x)	Volatile Organic Compounds (VOC)	Carbon Monoxide (CO)
Target Reduction (tonnes)	234 (20% below diesel)	0.0060	0.54	-0.122	0.400	2.86
Actual Reduction (tonnes)	263	0.0063	0.53	-0.113	0.387	2.95

Fuel Efficiency

During the project, the fuel efficiency in the pilot trucks was compared to the control trucks, and to their own fuel efficiency before biodiesel was used. Although there were differences in the fuel efficiency, the differences were not statistically significant. Further testing would

be required to determine whether there is any relationship between the use of biodiesel and fuel efficiency.

Conclusion

The use of B20 in Hbc's test trucks reached and exceeded expectations. No filter clogging problems occurred as Hbc pursued a proactive maintenance schedule, which entailed some increase in maintenance costs. No technical problems occurred with the use of B20, including its use in cold weather. The expected carbon dioxide reduction was surpassed. Hbc was pleased with the results of the pilot project, and has continued to use B20 in all the test vehicles and has expanded the program to several other vehicles.

Additional Information

- Hbc: <http://www.hbc.com>
- Energy Advantage: <http://www.energyadvantage.com>
- US Environmental Protection Agency – Biodiesel:
<http://www.epa.gov/otaq/models/biodsl.htm>
- Canada Clean Fuels Inc. : <http://www.canadacleanfuels.com>
- AGAT Laboratories: <http://www.agatlabs.com>