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Canada

BIOFUELS ANNUAL

2012 - revised

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Report Highlights:
Note: The Canada Biofuels Annual has been resubmitted to correct for formatting. On July 1, 2011, Canada implemented a federal mandate of 2 percent renewable content in the national distillate pool. This requirement is in addition to the mandate of 5 percent renewable content in the national diesel and heating oil pool. As the Canadian biofuels industry is preparing to comply with the requirements, production of ethanol and biodiesel have increased over the past year. Ethanol production in 2012 is estimated to increase 40 percent from 2011 levels, and biodiesel production is estimated to increase nearly 80 percent. At this time, the Canadian biofuels industry remains below Post's estimates to meet the federal standards, and limited production suggests that Canada will not soon become a major player in the global ethanol market.

Executive Summary:

Since December 15, 2010, Canada has had a federal mandate requiring five percent content of the national gasoline pool to be renewable (ethanol). In addition, many provinces have equivalent or higher provincial mandates, including a 5 percent renewable content mandate in Ontario, 7.5 percent in Saskatchewan, and 8.5 percent in Manitoba. In 2012, these three provinces alone are expected to make up about 88 percent of Canada's overall ethanol production. British Columbia and Alberta account for approximately a quarter of net national gasoline sales and both have 5 percent renewable fuel mandates.

Ethanol production in Canada will increase in 2012 to an expected 1,867 million liters, up nearly 40 percent from estimated 2011 levels. Production is forecast to grow further to 1,948 million liters in 2013. While this does not surpass the federal content requirement that Post estimates as 2,054 for 2012 and 2,074 for 2013, it is not far below. The overall ethanol production capacities for 2012 and 2013 are 1,836 and 1,874 million liters respectively. Compared to 2011's 75 percent national ethanol capacity use, cumulatively, Canada's ethanol plants are estimated to be running above capacity at 102 percent for 2012 and even higher for 2013 (due to the completion of two new ethanol plants: Growing Power Hairy Hill in Hairy Hill, Alberta, and Enerkem's waste-to-biofuels facility in Edmonton, Alberta). Primary feedstocks remain corn and wheat.

Canada's limited biofuel production, both in the short and medium term, suggests that Canada will not soon become a major player in the global ethanol market. While domestic supply in Canada limits the amount of trade, there is an increasing amount of trade in the co-products of ethanol production. North-south trade between Canada and the United States in biofuels reflects the most economical trade corridors.

The federal government, as of July 1, 2011, implemented date a federal mandate of two percent of renewable content in diesel fuel and heating oil. The eastern part of Canada has been given an implementation exemption until December 31, 2012 (18 months) in order to get the necessary blending infrastructure in place. At this time, Canada's biodiesel industry remains below Post's estimation of approximately 585 million liters needed to meet the federal standard if it was in full effect in 2012. In 2012, domestic production of biodiesel is forecast to reach 284 million liters, a nearly 80 percent increase over the estimated 2011 production level of 158 million liters. The federal mandate, the extension of a government program to help increase investment in the biodiesel industry, and the completion of four new biodiesel refineries (including a 265 million liter Archer Daniels Midland plant in Alberta), is forecast to help increase production levels of biodiesel to 538 million liters in 2013, and surpass the federal requirement by 2014.

In 2012, the share of biodiesel production from tallow (animal fats) is expected to fall from 2011 levels of 60 percent to 38 percent due to new biodiesel plants using other feedstocks. The share however is expected to fall further in 2013 to 32 percent with the expected completion of a 265 million liter canola-oil and 170 million liter canola/soybean feedstock-based biodiesel plants.

Policy and Programs

Context: Canada's Overall Energy Situation

Unlike the United States, energy security is not a factor behind the recent and projected growth in Canada's renewable fuel industry. Canada has the world's second largest proven oil reserves (estimated at 180 billion barrels) and is one of the top 10 oil-exporting countries in the world.

While Canada is a significant producer of oil, it also ranks among the world's top ten consumers of petroleum. Between the years of 2005-2009 transportation accounted for nearly one-third of energy consumption (see Appendix I, Table 9), and motor gasoline and diesel fuel oil accounted for approximately 86 percent of the energy used (see Appendix I, Table 10). A closer look at the use of energy within the transportation industry shows that on average between the years 2003-2009 (most recent available data), the share of energy used for freight averaged a little more than 41 percent per year and the share of energy used for passenger transportation averaged 55 percent (see Appendix I, Table 11).

A breakdown of transportation energy use by fuel type reveals that gasoline and diesel fuel account for an average of 54 percent and 32 percent, respectively, of the fuel type used in the period 2005-2009 and now dominate as the transportation sector's main energy sources (see Appendix I, Table 10). Table 1 below illustrates the mandated biofuel blend rates for the Canadian transportation industry. It should be noted however that, as will be presented in the following section, the Canadian (federal) renewable fuel mandate goes beyond transportation fuel for diesel to include heating distillate oil.

Table 1

Transport Fuel* Consumption - Biomass-based & Fossil Fuels (mil liters)

CY	2006	2007	2008	2009	2010	2011	2012	2013
Conventional Biofuels	246	992	1,238	1,181	1,628	2,183	2,377	2,376
Bioethanol (a)	200	900	1,140	1,076	1,501	2,020	2,050	2,051
Biodiesel (b)	46	92	98	105	127	163	327	325
Pure Vegetable Oil	-	-	-	-	-	-	-	-
Advanced Biofuels	-	-	-	4	4	5	5	24
Cellulosic BioEthanol	-	-	-	4	4	5	5	24
Cellulosic BioDiesel	-	-	-	-	-	-	-	-
Drop-in Gasoline	-	-	-	-	-	-	-	-
HVO Fuels	-	-	-	-	-	-	-	-
Drop-in Diesel	-	-	-	-	-	-	-	-
Drop-in Jet Fuel	-	-	-	-	-	-	-	-

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Transport Fuel* Consumption - Biomass-based & Fossil Fuels (mil liters)								
CY	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Total Biomass-based Fuels	**246**	**992**	**1,238**	**1,185**	**1,632**	**2,188**	**2,382**	**2,400**
BioEthanol/Drop-in Gasoline	200	900	1,140	1,080	1,505	2,025	2,055	2,075
BioDiesel/Drop-in Diesel	46	92	98	105	127	163	327	325
Bio Jet Fuels	-	-	-	-	-	-	-	-
Total Fossil Fuels (c)	**61,855**	**62,718**	**61,394**	**61,706**	**62,670**	**62,014**	**62,178**	**62,519**
Gasoline	38,454	38,735	38,009	38,628	39,054	38,681	39,039	39,408
Diesel	16,566	17,041	16,457	16,083	16,575	16,246	16,005	15,931
Jet Fuel	6,835	6,942	6,928	6,995	7,041	7,088	7,134	7,181
Total Fuel Markets (d)	**62,101**	**63,710**	**62,632**	**62,891**	**64,302**	**64,202**	**64,560**	**64,919**
Gasoline Market (e)	38,654	39,635	39,149	39,708	40,559	40,706	41,094	41,483
Diesel Market (f)	16,612	17,133	16,555	16,188	16,702	16,409	16,332	16,256
Jet Fuel Market (g)	6,835	6,942	6,928	6,995	7,041	7,088	7,134	7,181
Biofuel Blend Rates (volume basis)								
Gasoline Market	0.5%	2.3%	2.9%	2.7%	3.7%	5.0%	5.0%	5.0%
Diesel Market	0.3%	0.5%	0.6%	0.6%	0.8%	1.0%	2.0%	2.0%
Jet Fuel Market	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Note: Gasoline and diesel information includes fuel for on-road use only
(a) 2006-2011 bioethanol consumption derived using provincial mandates, federal mandates, and data on gasoline sales for road motor vehicles (Statistics Canada) and data from the Energy Information Administration (Branch of U.S. Department of Energy); year 2012, 2013 derived using the federal mandate and gas consumption trend projections.
(b) 2006-2010 biodiesel consumption for motor vehicles were derived using provincial madates and sales of diesel for road motor vehicles published by Statistics Canada. 2011-2013 biodiesel consumption for motor vehicles was derived using the provincial and federal mandates, and projected sales of diesel sales for motor vehcicles
(c)Total Fossil Fuel Markets is calculated by subtracting biofuel consumption from total fuels market
(d) Total Fuels Market calculated as biofuels for transportation plus total fossil fuels for transportation
(e),(f) source for 2006-2010 are sales of gasoline and diesel for road motor vehicles published by Statistic Canada, 2011-2013 are trend projections of fuel use for road motor vehicles
(g)For 2006 - 2008, consumption based on data from Energy Information Administration (EIA); For 2009 - 2013, information based on trend

A. National Biofuels Mandate

Canada's government announced a renewable fuels strategy in late 2006, including a national renewable fuels mandate. Since that time, there have been legislative amendments and federal and provincial incentive programs that have encouraged the development of a Canadian renewable fuels industry. On August 23, 2010, the finalized (official) federal Renewable Fuel Regulations, came into force. The regulations set the five percent renewable fuel mandate for the national gasoline pool to come into effect on December 15, 2010 (full regulations). The commencement date for the mandated average 2 percent renewable fuel content in diesel fuel and heating distillate oil, which is also a provision of the federal Renewable Fuel Regulations, was omitted. The reason for this omission was that the demonstration of technical feasibility under the range of Canadian conditions had not yet been completed. On June 29, 2011, the federal government announced it was moving ahead with a July 1, 2011 implementation date for a federal mandate of two percent of renewable content in diesel fuel and heating oil. A permanent exemption has been provided for renewable content in diesel fuel and heating distillate oil sold in Newfoundland and Labrador to address the logistic challenges of blending biodiesel in this region. Temporary exemptions for renewable content in diesel fuel and heating distillate oil sold in Quebec and all Atlantic provinces have been provided until December, 31, 2012, to give eastern Canada time to install biodiesel blending infrastructure. The official regulations are available at http://www.gazette.gc.ca/rp-pr/p2/2011/2011-07-20/html/sor-dors143-eng.html. The Renewable Fuels Regulations are annexed to the Canadian Environmental Protection Act, 1999.
The overall structure is similar to the Renewable Fuel Standard in the United States, with the point of compliance at the point of production or importation. The objective of the regulations is to reduce green house gas (GHG) emissions by mandating renewable fuel content based on the gasoline volume, as well as diesel fuel and heating distillate oil volumes, fighting climate change. The regulations are estimated to result in an incremental reduction of GHG emissions of about one ton of carbon dioxide equivalent (1 MT CO2) per year over and above the reductions attributable to existing provincial requirements already in place. The regulations fulfill the commitments under the federal government`s Renewable Fuels Strategy of reducing GHG emissions from liquid petroleum fuels and creating a demand for renewable fuels in Canada.

B. Federal Programs to Encourage the Development of a Canadian Renewable Fuels Industry

With its announcement of a renewable fuels strategy, the Canadian government launched several programs designed to promote the development of a domestic renewable fuels industry. Several of the programs are designed to encourage agricultural producer involvement in renewable fuels and the usage of agricultural biomass to produce bioethanol. Many federal programs which were announced as part of the renewable fuel strategy expired at the end of March 31, 2011. The federal government has not, as of yet, announced any future measures to replace the programs which have expired.

Table 2			
Federal Programs to Promote a Domestic Renewable Fuels Industry			
Program Name	**Budget Allocated / Administering Ministry or Agency**	**Type of Program**	**Program Design / Duration**
Renewable Fuels Regulations	Environment Canada; RFR are annexed to the Environment Canada Act, 1999	Federal requirement for 5 percent renewable content in the Canadian gasoline pool and a 2 percent renewable content in the distillate pool.	Renewable fuel mandate for gasoline pool came into effect on December 15, 2010. Renewable fuel mandate for the distillate pool came into effect July 1, 2011 and must be met by December 31, 2012 in eastern Canada.
EcoEnergy for Biofuels Overview	C$1.5 billion; Administered by Natural Resources Canada	Production incentive program (subsidy); production capacity building	Provides incentive rates of up to $0.10/liter (L) for renewable alternatives to gasoline and $0.26/L for renewable alternatives to diesel for the first three years, declining in the 6 years thereafter; program runs April, 2008 - March 31, 2017 . The final round of funding has closed.
ecoAGRICULTURE Biofuels Capital Initiative	C$200 million; Administered by Agriculture and Agri-Food Canada	Loan (repayable contributions)	Encourages producer equity/ownership in bio-fuel facilities. The program helps fund projects that use agricultural feedstock to produce bio-fuels and requires agricultural producer equity investments of 5 percent to meet the eligibility requirements. The funding increases as producer investment increases, however

			a contribution cap of C$25 million applies; program has been extended from March 31, 2011 to September 30, 2012.

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Federal Programs to Promote a Domestic Renewable Fuels Industry

Program Name	Budget Allocated / Administering Ministry or Agency	Type of Program	Program Design / Duration
Agricultural Bio-products Innovation Program (ABIP)	C$145 million; Administered by Agriculture and Agri-food Canada	Grants	Seeks to mobilize research networks that conduct scientific research projects with a specific focus on developing effective and efficient technologies for an agricultural biomass conversion; evolve beyond bio-fuels production to a sustainable, bio-based economy; Program runs multi-year.
Agri-Opportunities Program	C$134 million; Administered by Agriculture and Agri-Food Canada	Loans (repayable contributions)	To accelerate the commercialization of new agricultural products, processes or services that are currently not produced or commercially available in Canada and that are ready to be delivered to the marketplace with for the United States on projects geared to new agri-food, agriculture or bio-products; program closed on March 31, 2011
NextGen Biofuels Fund	C$500 million; Administered by Sustainable Development Technology Canada	Loans (repayable contributions)	To increase production capacity of 2nd generation bio-fuels; to spur investment with the private sector in establishing large-scale facilities for the production of next-generation renewable fuels, to address the gap between demonstration and commercialization; program closed March 31, 2011
Biofuels	C$20 million;	Direct payment,	Provides financial assistance to

Opportunities for Producers Initiative	Administered by Agriculture and Agri-food Canada; funding delivered through regional industry councils	encourage producer ownership / involvement	develop bio-fuel feasibility studies (suitability of bio-fuel production in local community) and business plans; funding was available for projects with greater than one-third producer ownership; program closed on March 31, 2008

C. Provincial Mandates and Programs to Encourage Renewable Fuels Industry Development

Provinces have led the way in developing mandates on renewable fuel contents. However, inconsistencies in provincial requirements may frustrate the flow of bio-fuel trade within Canada. There is concern that, with each provincial government implementing its own complex production and/or consumption incentives with differences in eligibility and duration, there may be barriers to trade and production in areas not well suited to bioethanol production. Canada's refineries are mostly in western Canada (Alberta) and on the east coast (Newfoundland and Labrador), while most gasoline is used in central Canada (Quebec and Ontario). The federal government has made note of these barriers and sees the federal mandate as a means to work with provinces to harmonize provincial mandates to eliminate inter-provincial trade barriers. However, given the lead provinces have to develop provincial regulations, the ability of the federal government to prevent barriers and uneconomic production is unclear.

Several provinces have implemented provincial mandates on the amount of bioethanol required in the gasoline pool. Certain provinces have also brought in legislation and regulations that have resulted in a renewable fuel standard for diesel fuel coming into force ahead of the federal biodiesel mandate. Table 3 summarizes the incentive measures that are currently in effect, and Appendix II provides detailed information:

Table 3

Renewable Fuels Standards, by Province

	Renewable Content	
Province	Gasoline *(bioethanol)*	Distillate *(biodiesel)*
British Columbia	5%	4%
Alberta	5%*	2%*
Saskatchewan	7.5%	2%**
Manitoba	8.5%	2%
Ontario	5%	

* In April 2011

**Beginning July 2012

Source-Canadian Renewable Fuels Association

Cap-And-Trade Research

Provinces have also taken the lead in cap and trade initiatives. In Alberta, a Green Fund and an Offset System already exists to allow large emitters to purchase carbon credits from farmers, and a law enacted in Saskatchewan in late April 2010 (The Environmental Management and Protection Act 2010) would allow the purchase of carbon credits from farmers there. Provincial and state governments in Ontario, Quebec, Manitoba, British Columbia, and California have discussed a protocol under the Western Climate Initiative (WCI). Quebec and California officially implemented the WCI's cap-and-trade regulations on January 1, 2012, and carbon emitters have been given until January 1, 2013 to make necessary adjustments. British Columbia, Ontario, and Manitoba have not yet named a start date for implementation but previously mentioned joining after the program starts. To date, there is a higher supply of carbon credits than demand, making them worth about $2.75/ton of sequestered carbon in the United States. In Alberta, carbon credits are trading at $9 to $13/ton, while in Europe, their value ranges from $20 to $30/ton. Future policy debates will focus on who claims the credits.

D. Factors Affecting the Long-term Viability of a Canadian Biofuel Industry

The long-term viability of producing biofuels in Canada will depend on a multitude of factors including federal/provincial regulations and implementation, plant size, production types, co-products, feedstock costs, energy prices, and production/consumption incentives. The required increase in biofuel production set out by the federal mandate will necessitate a buildup of infrastructure to support the industry.

More detailed trade statistics are needed to measure the development of the biofuels market and the markets for the co-products. Canada's limited production capacity, both in the short and medium term, suggest that Canada will not soon be a significant player in the global bioethanol market. While the possibility of increased bioethanol trade, especially between the northwest United States and Western Canada (wheat-bioethanol to the United States and corn-based bioethanol to Canada), is unlikely to develop quickly, there is an increasing amount of trade in the co-products of bioethanol production, such as distiller's dried grains (DDGs).

Ethanol and Biodiesel

A. *Bioethanol*

Table 4								
Fuel Ethanol - Conventional & Advanced Fuels (Mil. Liters)								
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012 (e)**	**2013 (f)**
Production, Total (a)	212	640	850	955	1200	1350	1867	1948
Advanced Only	0	0	0	4	4	5	5	24
Imports (b)	20	295	336	169	365	684	500	500
Exports (c)	8	20	30	58	47	36	215	365
Consumption (d)	200	900	1140	1080	1505	2,025	2,055	2,075
Ending Stocks (g)	29	44	60	46	59	32	129	137
Production Capacity	**Conventional (h)**							
No. of Biorefineries		10	12	14	15	16	16	16
Capacity (Mil. Liters)	340	850	1,135	1,265	1,590	1,790	1,831	1,831
Capacity Use (%)	62%	75%	75%	75%	75%	75%	102%	105%
Production Capacity	**Advanced (h)**							
No. of Biorefineries	0	0	0	1	1	1	1	2
Capacity (Mil. Liters)	0	0	0	4	4	5	5	43
Capacity Use (%)	0%	0%	0%	100%	100%	100%	100%	56%
Co-product Production	**Conventional only (1,00 MT) (i)**							
Distiller's Dried Grains with Solubles (DDGS)				980	1,029	1,153	1,597	1,658
Feedstock Use	**Conventional (1,000 MT (j)**							
Corn				2,105	2,255	2,630	3,717	3,714
Wheat				770	770	770	1,001	1,169
Feedstock Use	**Advanced (1,000 MT) (k)**							

Wood Waste	0	0	0	13	16	16	16	16
Municpal Solid (Landfill) Waste	0	0	0	0	0	0	0	50

Notes & Sources

(a), For 2006 - 2011, production estimated at 75% plant capacity (plants coming online at different times); for 2012 - 2013, based on industry discussions

b), (c) source is Global Trade Atlas Network; Canada has only recently designated for fuel grade ethanol; before April 2012, fuel ethanol was included in a broader category: HS 22072012; imports are assumed to be approximately 70 percent of U.S. share of broader import line: HS 22072012

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(d) 2006-2011 bioethanol consumption derived using provincial mandates, federal mandates, and data on gasoline sales for road motor vehicles (Statistics Canada) and data from the Energy Information Administration (Branch of U.S. Department of Energy); year 2012, 2013 derived using the federal mandate and gas consumption trend projections.
(e) Estimated
(f) Forecast
(g) No official statistics available, assumed to be 5% - 7% of production once mandates are in place
(h) Based on plants' nameplate capacities and discussion with industry
(i) Conversion Rate- Every ton of corn/other feedstock produces 33 percent DDGs, Every ton of wheat feedstock produces 37 percent DDGs. Numbers are rounded to convey these figures are derived from formulas, not actual reported statistics.
(j) Conversion Rate - One ton of corn will provide enough feedstock to produce 400 liters of bioethanol, and one ton of wheat will provide enough feedstock to produce 375 liters of ethanol according to the Canadian Renewable Fuels Association. Numbers are rounded to convey these figures are derived from formulas and not actual reported statistics.
(k) Conversion rate is based off the inference that 100,000 metric tons of municipal landfill waste will produce 38 million liters of ethanol. This inference is made based on information stated by Enerkem.

i. Production

Bioethanol production in Canada will increase by 38 percent in 2012, due in part to a new plant coming on-line this fall (Growing Power Hairy Hill, see Table 22, Appendix III) as well as many plants either increasing or running at a higher percentage of capacity in 2012. Production is estimated to increase to 1,867 million liters, up from the estimated 1,350 million liters in 2011. Production is forecast to grow even further to 1,948 million liters in 2013 with the expected completion of the 38 million liter Enerkem Waste-to-Biofuels Facility in Edmonton, Alberta. Factors most affecting changes in production will include gasoline prices, technological improvements and the impact of federal and provincial mandates.

In 2012, it is estimated that 79.6 percent of the production of domestic bioethanol will be derived from corn, 20.1 percent from wheat and 0.3 percent from "other" feedstock such as wood waste, wheat straw, and landfill waste. Post forecasts that this will likely change to 76.3 percent corn, 22.5 percent wheat and 1.2 percent "other" feedstock for 2013 due to the estimated completion of the Enerkem, Edmonton plant in the second half of the year, which is estimated to produce 19 million liters of ethanol from landfill waste in 2013. Overall, Canada's limited biofuel production capacity, both in the short and medium term, suggests that Canada's entry into the global bioethanol market is still quite distant.

In 2012, Ontario alone is estimated to account for 61 percent of current domestic bioethanol production capacity. Saskatchewan is estimated to account for 19 percent, Quebec is estimated to account for 9 percent, and Alberta and Manitoba combined are estimated to account for 11 percent.
While the federal and provincial programs have been designed to encourage bioethanol plants with greater agricultural producer/rural community equity or investment, Canadian bioethanol is produced by companies that range from (a) energy companies and energy marketers, to (b) companies which focus on grain-based bioethanol production that often have some degree of producer equity/investment, to (c) co-operatives, to (d) companies focused on a range of activities such as grains, or other sources of renewable fuels. To date, multinationals have not expressed interest in Canadian produced bioethanol, seeing Canada primarily as a market for U.S.–produced bioethanol. This is unikely to change in the short to medium term as Canada is still working towards building enough production capacity to meet its domestic mandate.

ii. Impacts of Bioethanol Production on Feedstock Markets

Corn and wheat are the main feedstock for bioethanol production in Canada and the introduction of the mandatory renewable fuel content by the Canadian government undoubtedly have had and will have an impact on production patterns. At this time, there are no official statistics for the amount of corn and wheat directed into bioethanol production.

(a) Bioethanol Produced from Corn

Corn remains the main feedstock for Canadian bioethanol production. Ontario is the largest corn-producing province in Canada. In 2012, 63 percent of Canadian bioethanol production is expected to take place in Ontario. In 2012 and 2013, corn is expected to account for between 76 and 80 percent of bioethanol feedstock, respectively. While no new corn-based ethanol plants are expected to come on-line in 2012 and 2013, there are several corn-based plants that have been proposed.

(b) Bioethanol Produced from Wheat

Wheat is the feedstock for most of the balance of Canada's bioethanol production. In 2011, it accounted for just under 25 percent of Canadian ethanol feedstock, and is forecast to account for 20-23 percent of bioethanol feedstock for years 2012, and 2013, respectively. The newer wheat bioethanol plants have more flexibility. Pipes are larger and allow the use of other feedstock, such as corn, when wheat feedstock may be too expensive. The Husky Energy's wheat-based bioethanol plant in Minnedosa, Manitoba uses corn when wheat feedstock is unavailable or too expensive. However, Husky Energy has agreed that 80 percent of the feedstock used to produce bioethanol will come from Manitoba producers.

The agreement is with the Manitoba government and expires in 2017.

As the bioethanol industry grows, demand for different wheat varieties is also expected to grow, resulting in increased competition between wheat end-users, such as the Canadian bioethanol producers, livestock producers and the milling industry. The need for high-yielding, low-protein wheat by the livestock industry and the bioethanol plants are in direct conflict with the needs of the flour industry. Increases in bioethanol efficient wheat is expected to affect production patterns and result in more Canadian wheat farmers seeding area to lower protein/high starch wheat such as Winter Wheat and Canadian Prairie Spring Wheat rather than higher protein/lower starch wheat varieties used by the milling industry. The livestock sector, especially the hog sector, competes for the same wheat varieties as the bioethanol sector.

Additional layers of complication that exist in Canada when wheat produced in Western Canada was used as a feedstock in bioethanol production are on the verge of removal. For nearly 70 years, the Canadian Wheat Board (CWB) has controlled the sales of wheat for human consumption and export. As long as the Western wheat bioethanol is used as fuel and the co-products such as DDG's went to feed livestock, the CWB has no involvement. If the plant fractionates the grain and removes components for human consumption, such as wheat gluten, then a portion of the wheat, technically, has to be purchased through the CWB. For the most part, however, bioethanol plants have purchased wheat in the same way a feed mill makes purchases, either directly from farmers or from a grain company. While the CWB promoted industrial uses for its western-grown grains and its mandate allowed it to enter the market for sales of wheat for bioethanol production, it chose not to do so. In late 2011, the Canadian federal government announced plans that will eliminate the CWB's involvement in sales of wheat for bioethanol production by August 1, 2012. Since the CWB has not been very involved in bioethanol production to date, it is unlikely that this change will have an effect on wheat-based bioethanol production.

iii. Consumption

Based on the trend of net national sales of gasoline used for road motor vehicles between 2006 and 2010, and the projected trend for 2010-2013 (see Table 5, below), the federal mandate of 5 percent renewable fuel content requires an estimated minimum of 2,054 million liters for 2012 and 2,074 million liters for 2013 of ethanol production, not just capacity. Production capacity of bioethanol is not expected to surpass 1,836 and 1,874 million liters in 2012, and 2013, respectively (see table 22, Appendix III).

Table 5

Canada: Sales of Gasoline Used for Road Motor Vehicles
in million liters

	2006	2007	2008	2009	2010	2011 (e)	2012 (f)	2013 (f)
Net sales of gasoline	38,654	39,635	39,149	39,708	40,559	40,500	41,100	41,500

Source: Statistics Canada
(e),(f) For 2011 - 2013, Post's estimates (e) and forecasts (f) are based on trend

iv. Trade

While there are no reliable trade statistics for Canada's fuel ethanol due to broad and changing HS codes, Post forecasts that imports will fall to 500 million liters per year for 2012 and 2013, down from an estimated 684 million liters in 2011. This decrease is expected to be driven by an increase in domestic production. Post expects that as domestic production increases, fuel ethanol exports to the United States will increase as U.S. demand remains strong due to the RFS2 mandate. Also, fuel ethanol trade takes advantage of the trade corridors that make the most economic sense. Exports for 2012 and 2013 are forecast at 215 and 365 million liters, respectively.

Due to the North American Free Trade Agreement (NAFTA), there is no tariff on renewable fuels produced in the United States and imported into Canada. However, Canada does have a tariff on bioethanol imported from other countries such as Brazil ($0.05 per liter).
While the current differences in provincial tax exemptions for renewable fuels do not greatly affect production decisions, the combination of lower oil prices (e.g. return to pre-2005 levels), and higher grain prices could make certain provincial tax-exemption restrictions obstacles to expanding the industry.

As Canada continues to expand bio-fuel production capacity through federal and provincial programs/strategies, potential trade issues such as World Trade Organization (WTO) rules, biotechnology, and inter-provincial barriers contrary to the national treatment principle embodied in the WTO and the NAFTA may arise.

Confrontations reflecting these concerns are likely, although still a long ways off, as an international trade/market for bioethanol and bio-diesel has yet to develop. In the meantime, Canada will be expanding its biofuels industry in order to meet its federal and provincial mandates.

In recent years, nearly 100 percent bioethanol trade for Canada has been done with the United States. However, the possibility of significant increases in bioethanol trade, especially between the northwestern United States and Western Canada (wheat-based bioethanol to the United States and corn-based bioethanol to Canada), is unlikely to develop in the short to medium term. This is due mainly to the fact that Canada does not have excess bioethanol production capacity, which would permit large volumes of exports to the United States. In addition, the transportation, distribution, and infrastructure issues around bioethanol trade have yet to be resolved.

v. Ending Stocks

Post has used an estimate of 5 to 7 percent of production to calculate ending stocks for Canada's ethanol industry, due to the lack of official statistics on ethanol stocks. Canada's increase in production, from 1,350 million liters to 1,867 and 1,948 million liters, for 2012 and 2013 respectively, will be reflected in Canada's stocks. Ending stocks for 2012 are expected to jump to 129 million liters, up from 32 million liters in 2011; they are expected to further rise to 137 million liters in 2013 (see Table 4, above).

B. ***Biodiesel***

Table 6								
Biodiesel - Conventional & Advanced Fuels (Mil. Liters)								
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011 (e)**	**2012 (e)**	**2013 (f)**
Production, Total (a)	46	92	100	122	139	158	284	538
Advanced Only	0	0	0	0	0	0	0	0
Imports (b)	0	0	5	5	50	200	210	60
Exports (c)	0	0	7	20	15	3	3	4
Consumption (d)	46	92	98	105	127	293	585	581
Ending Stocks (g)	2	4	4	6	53	115	21	34
Production Capacity	**Conventional (h)**							
No. of Biorefineries	3	3	4	5	9	11	13	15
Capacity (Mil. Liters)	102	102	118	165	186	207	407	738
Capacity Use (%)	45%	45%	90%	85%	74%	75%	76%	70%
Production Capacity	**Advanced**							
No. of Biorefineries	0	0	0	0	0	0	0	0
Capacity (Mil. Liters)	0	0	0	0	0	0	0	0
Capacity Use (%)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Feedstock Use	**Conventional (1,000 MT) (i)**							
Canola	1	1	1	20	25	25	49	147
Soybean	0	0	0	0	0	0	29	74
Animal Fats	45	90	90	90	95	105	84	135
Recycled Oils	0	0	0	30	40	45	61	66

Notes & Sources
(a), For 2006 – 2010, production numbers are from the Energy Information Administration; 2011-2013 are based on industry discussions.
(b), (c) HS codes are too broad to accurately capture biodiesel trade flows; Post estimates are based on industry discussions.
(d) For 2006 – 2013, consumption numbers are from the Energy Information Administration; 2011 – 2013 are Post's estimates calculated using provincial mandates and federal mandates; for federal mandate component, no statistics on distillate heating oil consumption were available, but assumed to account for 45 percent of requirement of national biodiesel requirements.
(e) Estimates
(f) Forecasts
(g) No official stocks data available, assumed to generally be between 4-7% of production.
(h) Based on name plate capacity and discussions with industry.
(i) Based on discussions with industry; Conversion rate used: Diesel density is about 0.85 kg/liter, thus 1 metric ton is approximately 1,276 liters. Numbers are rounded to convey these figures are derived from formulas and not actual reported statistics.

i. Biodiesel Production

The federal biodiesel mandate of 2 percent in diesel fuel and distillate heating oil came into effect on July 1, 2011. A permanent exemption has been provided for renewable content in diesel fuel and heating distillate oil sold in Newfoundland and Labrador to address the logistic challenges of blending biodiesel in this region. Temporary exemptions for renewable content in diesel fuel and heating distillate oil sold in Quebec and all Atlantic provinces have been provided, until December, 31, 2012, to give Eastern Canada time to install biodiesel blending infrastructure. This announcement, in combination with the extension of the ecoABC Initiative (a program to assist in the construction of biofuel facilities that have a minimum of five percent producer investment) which has been extended until September of 2012, is likely to help spur on investment in biodiesel production facilities. With the ecoABC Initiative and forecasted increased production, industry is preparing to comply with the 2013 requirements.

Biodiesel production is projected to increase slightly in 2012 to 284 million liters, up from an estimated 158 million in 2011, due to new production capacity. In 2013, production is forecast to nearly double to 538 million liters, partially due to the expected completion of a 265 million liter plant. In the longer term, the EU's increased demands for renewable energy has generated a potential and growing market for biodiesel exports from Canada, as has the RFS2 in the United States. With the current plants and four plants under construction, including a 265 million liter Archer Daniels Midland (ADM) plant, the federal biodiesel mandate is likely to be met with domestic production by 2014. ADM, a large American company involved in over 75 countries, is the first instance of multi-national interest in the Canadian biodiesel industry. Despite the current growth, future growth of the Canadian biodiesel industry may be limited due to the industry's inability to secure cheap feedstock. Most of the current and forecasted increase in biodiesel comes from canola and strong world demand for vegetable oils may hinder Canada's ability to take advantage of the growing biodiesel market opportunities.

The federal government's biofuel strategy program is geared more towards bioethanol and is therefore limited in their ability to address the limiting factors for biodiesel market growth. This has implications

when trying to determine the profitability for a biodiesel venture. For example, crushing plants can be used to produce oil for both biodiesel production and human consumption, but the federal government does not want to inadvertently subsidize crushing capacity for oils destined for human consumption. As mentioned previously, in order to help stimulate investment in the domestic production of biodiesel, the federal government's ecoABC Initiative, a program to assist in the construction of biofuel facilities that have a minimum of five percent producer investment, has been extended from March 31,2011 to September of 2012.

ii. Impacts of Biodiesel Production on Feedstock Markets

While biodiesel can be made from a variety of different feedstocks, prices and availability are the determining factors of which one will be used. Canola, due to the abundance of the Canadian production, has proven to be the natural feedstock choice. Projected canola-based biodiesel production shows increases from 63 million liters (22 percent production share) in 2012 to 188 million liters (35 percent share) in 2013, and even further in 2014. Key competitors facing canola oil for use in biodiesel are rendered animal fats (tallow), rendered oils (yellow grease), palm oil (which would be imported as Canada does not produce palm oil), and soybean oil. Canola and soybeans are high-priced feedstock for biodiesel since they are priced as food oils in international markets. Palm oil and rendered fats are priced at feed and industrial use levels.

In fall of 2011, the United States Environmental Protection Agency (EPA) signed the Canadian Aggregate Approach Petition to approve Canadian feedstocks, including canola, for biodiesel production in the United States. This decision provides secure access for Canadian canola as a sustainable feedstock for U.S. biodiesel markets. As a result, it is likely that there will be more Canadian exports of canola to the United States to meet RFS2, with some canola derived biodiesel returning to Canada.

Most of the growth in biodiesel production capacity has occurred in Western Canada, where the majority of the canola is grown, spurred on by provincial mandates in addition to the federal mandate.

Canola production has reached record high levels in recent years. Increased demand for canola oil from the food retail industry has resulted in higher prices. In 2012, canola producers have responded by planting record acreage, up 8 percent from an already record 2011 year. However, recent flooding in Saskatchewan's canola fields may be a setback. Despite this supply response, some industry observers suggest that canola could remain too expensive, and that a 2 percent biodiesel blend must be met with cheaper feedstock. As demand for the feedstock increases, it is likely that canola prices will also increase.

While canola use for biodiesel by-itself may be expensive, the co-products from biodiesel production may make economic sense. Co-products include meal to be used in animal feed. There are limits on the profitability of using canola as a feedstock if by-products are part of the everyday production process. For example, off-seed canola may not be a suitable feedstock since this meal may not meet quality standards. Despite these limitations, co-products and the production capacity of the plants (these plants could be supplying over 40 percent of the federal 2 percent biodiesel mandate), combined with provincial biodiesel mandates may make the industry profitable, despite higher commodity prices.

In 2012, the share of biodiesel production from tallow (animal fats) is expected to decrease from estimated 2011 levels of 60 percent to 38 percent due to completion of new biodiesel plants using other feedstocks. While the use of tallow for biodiesel is forecast to increase by 62 percent in 2013, the share is forecast to fall from 38 percent to 32 percent with the expected completion of 265 million liter canola-oil and 170 million liter canola/soybean feedstock-based biodiesel plants. The share of biodiesel produced from yellow grease is forecast to fall to 16 percent in 2013 from 2012 levels of 27 percent. Most dramatically, biodiesel produced from canola oil is forecast to nearly triple from 63 million liters (a 22 percent share) in 2012, to 188 million liters (a 35 percent share) in 2013. This increase is principally due to the completion of two new biodiesel plants using canola as feedstock (see Appendix III, Table 23).

iii. Consumption

Based on the trend of net national sales of diesel used for road motor vehicles between 2006 and 2010 (see Table 7, below), and the federal mandate which includes renewable fuel content in both the diesel oil sales for transportation as well as heating, Post estimates that Canada will consume 585 million liters of biodiesel in 2012 and forecasts consumption at 581 million liters of biodiesel production in 2013 (see Table 6, above). By 2013, the temporary exemptions for eastern Canada and Quebec will have been lifted and the full federal mandate should be in force.

Table 7

Canada: Sales of Diesel Used for Road Motor Vehicles
in million liters

	2006	2007	2008	2009	2010	2011 (e)	2012 (e)	2013 (f)
Net sales of diesel oil	16,612	17,133	16,555	16,188	16,702	16,638	16,485	16,441

Source: Statistics Canada
(e), (f) For 2011 - 2013, Post's estimates and forecasts are based on trend.

iv. Biodiesel Trade

Trade data for biodiesel is problematic since Canada has not had a dedicated tariff code for biodiesel. An HS code was assigned for 2012 trade, but products included under the code remains unclear. Adding to the complication, a European Union anti-dumping trade investigation which concluded in 2010, revealed inconsistencies between the European Union biodiesel import trade data and the Canadian biodiesel production capacity, which is still in its infancy. The trade data used in this report is therefore based on discussions with Canadian industry.

Lack of biodiesel production capacity in some provinces has meant that some provincial mandates have necessitated the importation of biodiesel to ensure compliance, such as BC in 2010. Imports are expected to continue to fill the gap between domestic production capacity and the required volume of biodiesel needed to meet the federal mandate, at least in the short run. Post expects to see a jump in imports in 2011 and 2012 in order to meet the federal mandate while domestic production capacity is

still building. Imports of biodiesel are expected to fall in 2013 as significantly more production capacity comes on-line. Exports are expected to remain relatively stable in 2012-2013 as U.S. tends to import the Canadian canola to make US biodiesel rather than import the finished product.

Of note, the two Canadian companies that participated in the EU anti-dumping investigation have been exempt from the anti-dumping duties placed on the Canadian biodiesel industry following the investigation. Future Canadian biodiesel companies who wish to export biodiesel to the European Union will be provided the opportunity to apply for exemptions as well.

More information on the EU investigation is available at:

Council implementing regulation no 443/2011 (anti-subsidy)
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:122:0001:0011:EN:PDF

Council implementing regulation no 444/2011 (anti-dumping)
http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:122:0012:0021:EN:PDF

v. Ending Stocks

There are no official statistics kept on biodiesel stocks, so Post assumed ending stocks to follow a general trend at 5-7 percent of production. In 2012, stocks are expected to decrease as Canada begins to comply with the federal mandate. Stocks are forecast to lift slightly in 2013, due to an increase in domestic production capacity.

C. Advanced Biofuels

While Canada is still not a significant producer of advanced biofuels, over the past few years it has been making progress toward beginning full-scale operation plants. In 2009, Enerkem opened a demonstration biofuels and biochemicals facility; in spring of 2012, this plant began production of cellulosic ethanol via treated wood as feedstock at a 5 million liter capacity. Although this may be the only advanced biofuels plant in Canada at the current moment, Enerkem is undergoing construction of a 38 million liter, cellulosic ethanol plant in Edmonton, Alberta. Edmonton will provide the plant 100,000 dry metric tons of municipal solid waste to the plant as feedstock; it is expected to be operational in early- to mid-2013. Further into the future, Varennes Cellulosic Ethanol L.P., a joint venture of Enerkem and Greenfield Ethanol Inc., is also planning a full-scale, cellulosic ethanol plant in Varennes, Quebec. The plant will use Enerkem's proprietary thermochemical technology to convert non-recyclable waste into 38 million liters of cellulosic ethanol per year.

Biomass for Heat and Power

A. Wood Pellets

There is current interest in exporting wood pellets from Canada to Europe to meet the increased demand for biofuels in European countries. The E.U. has been increasing funding for renewable energy production, including doubling the financial allotment of funds to renewable energy in 2007. In 2004, the E.U., announced that by 2020, 20 percent of its total energy consumption requirements will be renewable energy sources, greatly higher than their current 7 percent rate. The pellet industry in Canada, especially in the west, has grown rapidly. According to the Canadian Wood Pellet Association, in 2012, Canada had 42 pellet plants with 3 million tons annual production capacity, compared to 2010's 33 plants and 2 million tons capacity.

The province of British Columbia accounts for about 65 percent of Canadian production and capacity. Collectively, the provinces of Alberta, Quebec, New Brunswick, Nova Scotia, and New Brunswick account for 35 percent. According to Executive Director Gordon Murray of the Canadian Wood Pellet Association, it is estimated that 90 percent of Canadian pellets were exported to Europe during 2010. In the United States, nearly all 800,000 of wood pellets tons are consumed domestically.

Table 8

Trade: Sawdust and Wood Waste/Scrap
HS Code 440130

Canadian Imports
in metric tons

Origin	2008	2009	2010	2011
World	487,182	649,346	532,894	438,135
U.S.	486,579	647,806	532,053	437,414
E.U.	105	1,316	83	308
% U.S.	99.88%	99.76%	99.84%	99.84%
% E.U.	0%	0%	0%	0%

Canadian Exports in metric tons				
Destination	**2008**	**2009**	**2010**	**2011**
World	1,262,096	1,342,972	1,607,943	1,652,986
U.S.	561,673	449,996	368,238	357,556
E.U.	648,385	842,385	1,155,908	1,236,248
% U.S.	44.50%	33.51%	22.90%	21.63%
% E.U.	51.37%	62.73%	71.89%	74.79%
Source: Global Trade Atlas, Statistics Canada				

B. Fuels Produced from Other Biomass

There has been growing interest and investment in producing bioenergy from sources other than corn and wheat. Recently, there have been announcements of joint ventures to make cellulosic bioethanol and biogas, including a joint cellulosic bioethanol venture announced by GreenField Bioethanol and Enerkem. Enerkem, a Quebec-based gasification and catalysis technology company, has developed technology to convert biomass such as municipal solid waste and wood residue into cellulosic bioethanol. Its commercial-scale demonstration facility in Westbury, Quebec, which was completed in 2009, reached 1,000 hours of operation in 2010 and agreed to sell all ethanol produced to GreenField Ethanol. Enerkem continues to grow, and is in the construction phase of its second plant, in partnership with the City of Edmonton and Alberta Innovates. The commercial waste-to-biofuels production facility is scheduled to begin ethanol production in the second half of 2013. It is expected to have a production capacity of 38 million liters of ethanol per year.

With support from the Government of Canada, Iogen Corporation built a demonstration plant to convert biomass fibers to bioethanol using enzyme technology. Additionally, Iogen and Shell Canada had decided to work jointly to construct a straw-based ethanol plant in western Canada. But with Shell's decision to abandon the plans, it was announced in early May that the plant will no longer be constructed. Furthermore, Iogen is cutting its workforce by over half to about 110 employees. Located in Ottawa, Ontario, Iogen's demonstration facility can process over 25 tons of wheat straw per week, but due to major restructuring, the plant is not currently producing any ethanol.

Biogas is also of increasing interest and investment. Two of the three bio-energy projects that received funding under Alberta's Biorefining Commercialization and Market Development Program and the Bio-energy Infrastructure Development Program are for the development of biogas as an alternative source of energy. Kingdom Farm Inc. received a significant grant to review the potential for bio-gas from large scale Alberta hog operations. Highmark Renewables Research also received a significant grant for a bio-gas feasibility study at a large scale dairy facility.

Most fuels derived from non-grain biomass remain at the research level. One company moving to commercialize this technology is Lignol Energy Corporation, which specializes in cellulosic bioethanol and biorefining. Lignol announced the completion of a fully integrated industrial-scale biorefinery pilot plant in Burnaby, British Columbia in 2009. This plant is an end-to-end producer of cellulosic bioethanol. On June 15, 2010, Lignol signed a research and development agreement with Novozymes, the world's leading producer of industrial enzymes, to make biofuel from wood chips and other forestry

residues. The partners aim to develop a process for making biofuel from forestry waste at a cost as low as $2 per gallon, a price competitive with gasoline and corn bioethanol at the current United States' market prices. On February 7, 2012, it was announced that Sustainable Development Technology Canada (SDTC) awarded $2.06 million to Lignol, in addition to $4.2 million already contributed.

Ontario Power Generation (OPG) is looking to buy two to three million tons of biomass annually by 2015 – the date at which the Ontario government has mandated an end to burning coal for electricity generation. Biomass is targeted to replace coal as soon as technical obstacles are overcome. OPG will phase out the use of coal at its thermal electricity stations by the end of 2014. However, for biomass to completely replace coal, it must find a more efficient and condensed solution for transport and handling.

Appendix I

Transport Fuel and Energy Consumption

Table 9

Domestic Energy Consumption
in petajoules

	2005	2006	2007	2008	2009	08/09
Residential	1,297	1,243	1,337	1,356	1,316	-2.90%
Commercial	1,346	1,284	1,350	1,396	1,381	-1.10%
Industrial	2,313	2,314	2,451	2,280	2,313	1.50%
Transportation	2,389	2,372	2,484	2,429	2,396	-1.40%
Agriculture	209	211	216	218	190	-12.80%
Public Administration	136	128	122	123	122	-0.80%
Total	7,690	7,552	7,960	7,802	7,718	-1.10%

* year 2009 is the year for which the most recent data is available

Source: Statistics Canada

Table 10

Transportation Sector Energy Use by Source
in petajoules

	2005	2006	2007	2008	2009
Total Energy Use	2,501	2,492	2,594	2,595	2,577
Electricity	4	4	3	2	3
Natural Gas	2	2	2	2	2
Motor Gasoline	1,371	1,373	1,397	1,381	1,401
Diesel Fuel Oil	782	783	819	844	822
Light Fuel Oil and Kerosene	0	0	0	0	0
Heavy Fuel Oil	68	57	69	66	58
Aviation Gasoline	3	3	3	3	3

Aviation Turbo Fuel	256	253	257	252	240
Propane	10	11	12	13	11
Shares (%)	**2005**	**2006**	**2007**	**2008**	**2009**
Electricity	0.1%	0.1%	0.1%	0.1%	0.1%
Natural Gas	0.1%	0.1%	0.1%	0.1%	0.1%
Motor Gasoline	54.8%	55.1%	53.9%	53.2%	54.4%
Diesel Fuel Oil	31.3%	31.4%	31.6%	32.5%	31.9%
Light Fuel Oil and Kerosene	0.0%	0.0%	0.0%	0.0%	0.0%
Heavy Fuel Oil	2.7%	2.3%	2.7%	2.5%	2.3%
Aviation Gasoline	0.1%	0.1%	0.1%	0.1%	0.1%

Table 10 continued on next page…

Table 10 – continued from previous page

Transportation Sector Energy Use by Source - % Shares

	2005	**2006**	**2007**	**2008**	**2009**
Aviation Turbo Fuel	10.2%	10.1%	9.9%	9.7%	9.3%
Propane	0.4%	0.5%	0.5%	0.5%	0.4%

* year 2009 is the latest year for which data was available

Source: Office of Energy, Natural Resources Canada

Table 11

Energy Use by Transportation Sector
in petajoules

	2003	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Total Energy Use	2,361	2,465	2,501	2,492	2,594	2,595	2,577
Freight	943	1,008	1,035	1,037	1,085	1,101	1,078
Passenger	1,324	1,360	1,367	1,355	1,407	1,392	1,406
Off road	95	97	99	101	102	102	93
Shares (%)	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
Freight	40%	41%	41%	42%	42%	42%	42%
Passenger	56%	55%	55%	54%	54%	54%	55%
Off road	4%	4%	4%	4%	4%	4%	4%

* year 2009 is the year for which the most recent data is available

Source: Office of Energy , Natural Resources Canada

Table 12

Canada: Sales of Fuel Used for Road Motor Vehicles
in million liters

	2006	**2007**	**2008**	**2009**	**2010**	**2011 (e)**	**2012 (e)**	**2013 (f)**

Net sales of gasoline	38,654	39,635	39,149	39,708	40,559	40,500	41,100	41,500
Net sales of diesel oil	16,612	17,133	16,555	16,188	16,702	16,638	16,485	16,441
Source: Statistics Canada (e), (f) For 2011 - 2013, Post's estimates and forecasts are based on projected trends.								

Appendix II

Provincial Mandates, Policies, Tax Exemptions, Incentives and Conditions

(i) Alberta Biofuels Policies

Biofuels Strategy/Policy Documents:

The buildup of biofuels production capacity in Alberta has largely been the result of its nine-point bioenergy plan, first announced in October 2006. In December 2008, the government built on this plan and announced its Provincial Energy Strategy.

Renewable Fuel Standard:

As part of the strategy, the government of Alberta announced its intention to implement a renewable fuel standard of 5 percent bioethanol content in gasoline and 2 percent renewable content in diesel by 2010. The implementation was later pushed back to April 1, 2011. In addition, the production and manufacturing life cycle of the renewable fuel must be at least 25 percent lower than emissions from producing and manufacturing the same quantity of traditional fossil fuels.

Production Incentives:

As mentioned in Table 14, the province of Alberta offers a Bioenergy producer credit program (PCP).

Context:

According to the most recent data, Alberta boasts approximately 11 percent of Canada's total population, 13 percent of net gasoline sales and 3 percent of bioethanol production capacity.

Table 13		
Alberta: Provincial Programs to Encourage the Development of a Biofuels Industry		
Program name:	Bioenergy Infrastructure Development Grant Program	Commercialization/Market Development Program
Budget Allocation:	Alberta's Biorefining Commercialization and Market Development Program and Bioenergy Infrastructure Development Program have both been fully	

	allocated and expired on March 31, 2011. Together, the programs supported more than 70 bioenergy projects with grants totaling approximately $150 million. These two programs are no longer accepting applications.	
Administering Ministry or Agency	Alberta Energy	Alberta Energy
Table 13 continued on following page…		

Table 13 – continued from preceding page		
Alberta: Provincial Programs to Encourage the Development of a Biofuels Industry		
Program name:	Bioenergy Infrastructure Development Grant Program	Commercialization/Market Development Program
Type of Program:	Financing grant	Financing grant
Program Design or Purpose:	To assist municipalities with the development and distribution infrastructure of biofuels and energy.	Designed to increase production capacity through the market development and commercialization of biofuels.
Duration	Began April 1, 2008 and originally was to end March 31, 2009 but extended to March 31, 2011.	Began April 1, 2008 and originally was to end March 31, 2009 but extended to March 31, 2011.
Additional notes:	Some program modifications due to its extension. For more on how this affects the programs see FAQs.	Some program modifications due to its extension.

Table 14		
Alberta: *P*rovincial Mandates, Tax Exemptions, Incentives, and Conditions		
Mandate	**Incentives**	**Conditions/Duration**
Alberta has enacted a Renewable Fuels Standard that will be implemented April 1 2011. It will require an average of 2 percent renewable diesel and 5	Bioenergy producer credit program (PCP): For the first 150 million liters of second-generation bioethanol capacity a plant has, the maximum producer credit amount is	Duration: The current credit program runs from April 1, 2007 – March 31, 2011. The PCP has been extended and expanded until March 31, 2016. Alberta's current bioenergy program treats all bioethanol equally. The extended program focuses on the great potential for

percent bioethanol.	$0.14/L; beyond 150 million liters, it is $0.09/L. The cap is $25.5 million per year. For electricity from biomass (e.g. biogas, syngas), the rate is $0.06 per kilowatt hour (kWh) for the first 26,280 megawatt hours (MWh) of production capacity; beyond 26,280 MWh, the rate $0.017 per kWh.	second generation bioethanol, which uses feedstocks like forestry, agricultural and municipal waste. Specifically, the program will encourage development of new technologies and facilities that use non-food crops, waste biomass or wood.

(ii) British Columbia Biofuel Policies

Biofuels Strategy/Policy Documents:
In 2008, the province of British Columbia (BC) committed to bioenergy and renewables and set an objective to lower greenhouse gases emissions 33 percent by 2020. The province, under its Ministry of Energy, Mines and Petroleum Resources, unveiled two strategy documents/plans related to using bioenergy resources to reduce greenhouse gases. The first is the BC Energy Plan, unveiled late February 2007. This document sets out the necessary steps for reducing BC's greenhouse gas emissions and commits to investments in alternative technologies, including biofuels for transportation. The second is the BC Bioenergy Strategy, which aims for BC biofuel production to meet 50 percent of the province's renewable fuel requirements by 2020. The BC Bioenergy Strategy was made public at the end of January 2008.

Renewable Fuel Standard:
Since January 1, 2010, but amended in June 2011, British Columbia's Renewable and Low Carbon Fuel Requirements Regulation has required:

- A provincial annual average of five percent renewable content in gasoline sold in British Columbia.
- A provincial annual average of three percent renewable content in diesel sold in British Columbia in 2010 and four percent in 2011 onward.
- A 10 percent reduction in the carbon intensity of transportation fuels by 2020.

Consumption Incentives:
Motor Fuel Tax Act and Carbon Tax Incentive
The incentives for bioethanol and biodiesel when blended with gasoline or diesel were discontinued, effective January 1, 2010. Fuel with at least 85 percent bioethanol, natural gas and propane (effective July 1, 2010) when used in a motor vehicle are exempt of the Motor Fuel Tax Act. Under specific conditions hydrogen is also exempt from the Motor Fuel Tax Act.

Table 15		
British Columbia: Programs to Promote a Provincial Renewable Fuels Industry		
Program Name	**Budget Allocated / Administering Ministry or Agency**	**Type of Program/ Program Design / Duration**
BC Bioenergy Network	C$25 million Ministry of Energy, Mines and Petroleum Resources; BC Bioenergy Network	Grant; funding assistance Capacity building; maximize biomass value; to encourage the development and marketing of wood-to-bioenergy and other bioenergy technologies Began April 1, 2008 and has no specific end date *Additional note: The projects funded so far include C$3 million in funding assistance to Lignol Energy Corporation, C$3 million to Nexterra, and C$400 thousand to Cedar Road, C$100,000 investment in University of British Columbia's Clean Energy Research Centre (CERC).*
Liquid Biofuels Program	C$ 10 million Ministry of Small Business, Technology and Economic Development	Grants, funding assistance; To help build up liquid biofuels production capacity; Call for applications went out late November, 2008, and application date closed January 2009. *Additional note: Projects that were awarded funding were announced in April 2009. Two of the eight projects are projects which use woody biomass to produce cellulosic bioethanol. The remaining six projects are for biodiesel production. For more information on these projects, see: Approved Liquid Biofuels Projects.*

Innovative Clean Energy Fund	C$ 25 million per year Ministry of Small Business, Technology and Economic Development	Grants, funding assistance; To address specific energy and environmental problems that have been identified by the province by supporting the pre-commercial energy technology that is new or commercial technologies not currently used in the province (note: the funding is not specific to biofuels, but alternative fuel technologies are eligible); Established in December 2007. *Additional note: The First Call was announced in July 2008, the Second Call was announced in April 2009, and the Third Call, First Intake was announce in March 2010. For more information on these projects, see: ICE Fund Project Round One.*

Context:
According to the most recent data, British Columbia boasts approximately 11 percent of Canada's total population, 13 percent of net gasoline sales and virtually no commercial bioethanol production capacity.

Table 16		
British Columbia: Provincial Mandates, Tax Exemptions, Incentives, and Conditions		
Mandate	**Incentives**	**Conditions/Duration**
5 percent for gasoline 4 percent for diesel-phased in over a two-year period: 3 percent average starting January 1, 2010; 4 percent (2011)	Fuel with at least 85 percent bioethanol, natural gas and propane (effective July 1, 2010) when used in a motor vehicle are exempt of the Motor Fuel Tax Act.	Under specific conditions hydrogen is also exempt from the Motor Fuel Tax Act. The incentives for bioethanol and biodiesel when blended with gasoline or diesel were discontinued, effective January 1, 2010.
	Carbon Tax Exemption The exemptions for bioethanol and biodiesel under the Carbon Tax Act, were discontinued, effective January 1, 2010.	Duration: No duration specified

(iii) Manitoba Biofuel Policies

Biofuels Strategy/Policy Documents:
Manitoba is developing its bioethanol and biodiesel industries under the Energy Development Initiative section of the Ministry of Innovation, Energy and Mines. Information on Manitoba's biofuels initiatives is available on the province's Energy Development Initiative website.

Renewable Fuels Mandate:
The implementation of The Bio-fuels and Gasoline Tax Amendment Act was enacted in the fall of 2007. The mandate requiring that 8.5 percent of the gasoline sold in the province must be bioethanol came into effect on January 1, 2008, beginning with a 5 percent bioethanol requirement for the first quarter of the year and moving to 8.5 percent for the remainder of 2008 and subsequent years. In December, 2007 the Province of Manitoba passed the Biofuels Act which includes strict licensing and fuel quality requirements and the option for a future biodiesel mandate.

Production Incentives:
The gasoline tax exemptions for bioethanol have been replaced by a direct producer grant that decreases over a period of eight years. The staggered, decreasing production incentives are as follows: 20 cents/liter producer incentive beginning January 1, 2008 until December 31, 2009; 15 cents/liter production incentive beginning January 1, 2010 until December 31, 2012; 10 cents/liter producer incentive beginning January 1, 2013 until December 31, 2015. To be eligible for the incentive, bioethanol must be produced in Manitoba and sold in Manitoba to fuel suppliers. More information on the program is available at: Bioethanol Fund Grant Regulation.

Context:
According to the most recent data, Manitoba boasts approximately 3 percent of Canada's total population, 3 percent of net gasoline sales and 8 percent of bioethanol production capacity.

Table 17

Manitoba: Provincial Mandates, Tax Exemptions, Incentives, and Conditions

Mandate	Incentives	Conditions/Duration
8.5 percent pool average bioethanol content in gasoline beginning April 1; 2008 2 percent biodiesel pool average in diesel beginning Nov. 1, 2009.	Direct Payment Bioethanol Production Incentive 15 cents/liter producer credit from January 1, 2010 December 31, 2012. 10 cents/liter from January 1, 2013 - December 31, 2015.	Condition: To be eligible for the credit, the bioethanol has to be produced and sold in Manitoba. The incentive is capped on an annual basis by the amount of bioethanol required for the mandate. Duration: January 1, 2008 – December 31, 2015.

(iv) Ontario Biofuel Policies

Biofuels Strategy/Policy Documents:
Ontario is the largest bioethanol-producing province in Canada and has been a leader in building bioethanol production capacity in Canada. Ontario's bioethanol strategy has two components; (1) a renewable fuel standard mandate, and (2) the Ontario Bioethanol Growth Fund (OEGF) that was created in 2005.

Renewable Fuels Standard:

As of January 1, 2007, the gasoline tax exemption of 14.7¢ a liter on the bioethanol portion of the bioethanol-blended gasoline is no longer in effect. At the same time, a mandate that requires on average, no less than-5 percent bioethanol be blended in the gasoline sold in Ontario came into effect.

Provincial Programs to Support the Development of a Regional Biofuels Industry:
The Ontario Bioethanol Growth Fund (OEGF) provides:

- C$32.5 million for capital assistance to help meet financial challenges; cannot exceed 10¢ per liter;
- C$60.5 million per year from 2007-2017 for operating assistance to address changing market prices; no operating grant will exceed 11¢ per liter of bioethanol;
- C$16 million in support of independent retailers selling bioethanol blends Independent Gasoline Blender's Transition Fund;
- C$7.5 million in private and public funds for research and development opportunities.

The OEGF is fully subscribed and is no longer taking applications.

Context:
According to the most recent data, Ontario boasts approximately 39 percent of Canada's total population, 40 percent of net gasoline sales and 61 percent of bioethanol production capacity.

Table 18
Ontario: Provincial Mandates, Tax Exemptions, Incentives and Conditions

Mandate	Incentives	Conditions
Effective January 1, 2007, all gas sold must contain no less than 5 percent bioethanol.	**Bioethanol** $32.5 million for capital assistance to help meet financial challenges; $60.5 million per year from 2007-2017 for operating assistance to address changing market prices; $16 million in support of independent retailers selling bioethanol blends; $7.5 million in private and public funds for research and development opportunities. **Biodiesel** Biodiesel used in a licensed motor vehicle is exempt from Ontario fuel tax (14.3 cents per liter).	None

(v) Quebec Biofuel Policies

Biofuels Strategy/Policy Documents:
Quebec currently has no mandate in place for renewable fuel content in gasoline. However, by the federal Renewable Fuels Regulations, an average of 5 percent renewable fuel content must be present in

gasoline across Canada by the end of 2012.

Production Incentives:
Quebec currently has in place a temporary refundable tax credit (maximum C$0.185 per liter), granted for a maximum of 10 years to corporations that produce bioethanol from renewable material and sell the bioethanol for use in Québec. It began April, 2006 and expires in 2018. An eligible corporation's bioethanol production must be sold in Quebec to a person holding a collection officer's permit issued under the Fuel Tax Act. Additional conditions for the credit limit a maximum bioethanol production credit of 126 million liters and no tax credit for the month in which the average monthly price of crude oil is equal to or greater than US$65, or the total cumulative production of bioethanol exceeds 1.2 billion liters. The reasoning for this limitation is that it was assumed that bioethanol would be competitive with gasoline if the price of crude oil exceeded $US65 a barrel. **Green Technologies Demonstration Program**
The purpose of the program is to finance demonstration projects of innovative technologies and procedures that have strong potential for reducing greenhouse gas emissions in Québec. It pursues the objectives of two different green development strategies, the Development Strategy of the Quebec environment industry and green technologies and the Québec Energy Strategy 2006-2015. The program focuses on reducing greenhouse gas emissions by supporting the development of technologies that limit or reduce greenhouse gas emissions; improving energy efficiency so as to reduce consumption of fossil fuels; replacing fuels and fossil fuels with renewable energy; contributing to the development of Québec industry and job creation in the green technology sector.
Enerkem

While some corn production takes place in Quebec, Quebec's focus is on the development of cellulosic bioethanol. It is Quebec's intention to use wood from its forestry industry to grow its bioethanol market. This technology seems to be moving closer to commercialization given the joint venture announcement between Enerkem, a Quebec-based gasification and catalysis technology company, and GreenField Bioethanol, Canada's leading bioethanol producer. Enerkem was founded in 2000 and currently operates two plants in Canada: a pilot facility in Sherbrooke, QC and a commercial-scale plant in Westbury, QC. It has recently started the construction of its waste-to-biofuels plant in Edmonton, AB, Canada, which has received C$23 million from the government of Alberta and the City of Edmonton. Additionally, Enerkem, in joint with GreenField Ethanol Inc., has proposed a plant in Varennes Quebec, Varennes Cellulosic Ethanol L.P. The Quebec government announced that it will be injecting $27 million into the plant. Varennes Cellulosic Ethanol L.P. will use Enerkem's proprietary thermochemical technology to convert non-recyclable waste into 38 million liters of cellulosic ethanol per year.

Context:
According to the most recent data, Quebec boasts approximately 24 percent of Canada's total population, 20 percent of net gasoline sales and 9 percent of bioethanol production capacity.

Table 19

Quebec: Provincial Mandates, Tax Exemptions, Incentives, and Conditions

Mandate	Incentives	Conditions/Duration
None	Tax Credit Refund On April 21, 2005, the	Tax credit is limited to a maximum bioethanol production credit of 126 million liters and *no tax*

	government announced a refundable tax credit, to be granted for a maximum of 10 years, to corporations that produce bioethanol from renewable material and sell the bioethanol for use in Québec.	*credit is given for the month in which the average monthly price of crude oil is equal to or greater than US$65 a barrel or the total cumulative production of bioethanol exceeds 1.2 billion liters* Duration: April 1, 2006 - March 18, 2018

(vi) Saskatchewan Biofuel Policies

Biofuels Strategy/Policy Documents:
Saskatchewan's "Go Green" strategy promotes environmentally friendly transportation. Initiatives include working with industry to develop E85 (fuel blends with 85 percent bioethanol and 15 percent gasoline) corridors in the province, developing a 1.4 billion liter biofuels industry in Saskatchewan, and implementing a Government and Crown vehicle purchase policy that requires all vehicles to be hybrid electric, alternative or flex-fuel, or within the top 20 percent efficiency in their class.

Renewable Fuels Mandate:
Saskatchewan currently has a 7.5 percent bioethanol content requirement in its gasoline.

Production Incentives:
Saskatchewan does not provide fuel tax exemptions for alternative fuels but does provide grants to fuel distributors through the Bioethanol Fuel Grants Program. To be eligible for the grants, the bioethanol used by the distributor has to have been produced at a facility located in Saskatchewan from biomass grown in Saskatchewan.

Enterprise Saskatchewan administers the Saskatchewan Bioethanol Program.

Table 20
Saskatchewan: Programs to Promote a Provincial Renewable Fuels Industry

Program Name	Budget Allocated / Administering Ministry or Agency	Type of Program/ Program Design / Duration
SaskBio	C$80 million Ministry of Agriculture	Loans, repayable contributions of up to C$10 million dollars; Created to provide an opportunity for Saskatchewan residents to participate in value-added biofuel production in Saskatchewan through investment ownership in biofuels facilities Began December 2008, end date December 2012 *Additional note:* Program conditions includes 5 percent Saskatchewan ownership and annual production capacity of a new facility of 2 million liters per year

Context:
According to the most recent data, Saskatchewan boasts approximately 3 percent of Canada's total population, 3 percent of net gasoline sales and 19 percent of bioethanol production capacity.

Table 21		
Saskatchewan: Provincial Mandates, Tax Exemptions, Incentives and Conditions		
Mandate	**Incentives**	**Conditions/Duration**
All gas sold must contain 7.5 percent bioethanol, began mid-2006.	Bioethanol Fuel Grants Program Grants for eligible fuel distributors.	Duration: No duration specified.

(vi) Biofuel Policies in Atlantic Canada

Biofuels Strategy/Policy Documents:
Biomass developments are increasing in Atlantic Canada. A number of pulp mills and forest product companies are exploring the integrated biorefinery approach and/or direct cellulose-to-ethanol production. The Atlantic Bioenergy Task Force comprised of stakeholders from the Nova Scotia, New Brunswick and Maine governments, universities and major forestry companies in the region, was formed in July. The group, which was made public in September 2009, is commissioned by Price Waterhouse Cooper to evaluate biomass availability and bioenergy technologies available to the forestry sector. A number of forestry biofuels and bioenergy projects will likely be forthcoming.

Nova Scotia is the only province to include a tax credit on biodiesel. The remaining Atlantic provinces have no incentives, mandates or tax credits regarding biofuels and are the only governments in Canada that do not have a biofuels or bioenergy policy in place. The New Brunswick Department of Environment has indicated that it will consider implementing the federal national standard in New Brunswick, but has not committed to an official provincial mandate.

Appendix III

Biofuel Plants: Existing, Expanding, Under Construction

Table 22

Bioethanol Production Plants: Existing, Expanding, Under Construction

Status	Location	Company Name	Primary Feedstock	Nameplate Capacity (million liters)
Existing	Varennes, Quebec	GreenField Ethanol	corn	160
Existing	Westbury, Quebec	Enerkem	wood waste	5
Existing	Chatham, Ontario	GreenField Bioethanol	corn	195
Existing	Sarnia, Ontario	Suncor Energy	corn	400
Existing	Tiverton, Ontario	GreenField Ethanol	corn	27
Existing	Johnstown, Ontario	GreenField Ethanol	corn	208
Existing	Collingwood, Ontario	Amaizeingly Green Products L.P. (formerly Collingwood Bioethanol)	corn	54
Existing	Aylmer, Ontario	IGPC	corn	150
Existing	Minnedosa, Manitoba	Husky Energy	wheat, corn	130
Existing	Lloydminster, Saskatchewan	Husky Energy	wheat	130
Existing	Weyburn, Saskatchewan	NorAmera Bioenergy	wheat	25
Existing	Lanigan, Saskatchewan	Pound-Maker	wheat	15
Existing	Belle Plaine, Saskatchewan	Terra Grain Fuels	wheat	150
Existing	Red Deer, Alberta	Permolex	wheat	42
Existing	Havelock,	Kawartha Ethanol	corn	*80*

	Ontario			
Existing	Unity, Saskatchewan	North West Terminal Ltd.	wheat	*25*
Under construction	Hairy Hill, Alberta	Growing Power Hairy Hill	wheat	*4 0*
Under construction	Edmonton, Alberta	Enerkem Inc.	municipal landfill waste	*38*
			TOTAL:	1,874
Source: Canadian Renewable Fuels Association and each respective company; forecasted production capacity for 2013				

Table 23

Biodiesel Production Plants: Existing, Expanding, Under Construction

Start-up	Location	Company Name	Feedstock	Nameplate Capacity (million liters)
2005	Montreal, Quebec	Rothsay	Animal fats, restaurant oils	45
1996	Foam Lake, Saskatchewan	Milligan Bio-tech	Canola oil	20
2006	Hamilton, Ontario	BIOX Corporation	Animal fats, yellow grease	67
2009	Winnipeg, Manitoba	Greenway Biodiesel	Canola, soybean	20
2009	Mississauga, Ontario	Methes Energies Canada	Restaurant oils	1
2008	Delta, BC	City-Farm Biofuel Ltd.	Recycled oil/tallow	50
2009	Arborg, Manitoba	Bifrost Bio-Blends	Canola	3
2010	Delta, BC	Consolidated Biofuels	Yellow grease, canola	11
2011	Springfield, Ontario	Noroxel (Methes Energies)	Restaurant oils	1
2011	St-Jean d'Iberville, Quebec	QFI Biodiesel (Methes Energies)	Restaurant oils	1
2011	Richmond, Quebec	Biocardel Quebec Inc.	Soybean, vegetable oil, animal fat	13

2012, under construction	Sombra, Ontario	Methes Energies Canada	Restaurant oils	5
2012, under construction	Welland, Ontario	Great Lakes Biodiesel	Canola, soybean	170
2013, under construction	Lethbridge, Alberta	Kyoto Fuels	Multiple feedstock (Mostly tallow)	66
2013, under construction	(West) Lloydminister, Alberta	Archer Daniels Midland	Canola	265
			TOTAL:	738

Source: Canadian Renewable Fuels Association and each respective company; forecasted production capacity for 2013