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Canada

Biofuels Annual

2013

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Report Highlights:
On July 1, 2011, Canada implemented a federal mandate of 2 percent renewable content in the national distillate pool. Proposed regulations, published in the Canada Gazette on May 18, 2013, will extend the Atlantic exemption period until June 30, 2013, and permanently exempt diesel heating oil from the 2 percent renewable content requirement. These regulations are in addition to the mandate of 5 percent renewable content in the national gasoline pool. As the Canadian biofuels industry is continuing compliance preparation, ethanol and biodiesel production has grown in recent years. Ethanol production in 2013 is estimated to increase about 4 percent from 2012 levels, and biodiesel production is estimated to more than double due to new production facilities. 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.

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I. Executive Summary

Since December 15, 2010, Canada has had a federal mandate requiring 5 percent 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 2013, these provinces alone are expected to make up about 86 percent of Canada's overall ethanol production. British Columbia and Alberta account for approximately a quarter of net national gasoline sales, but are expected to make up only 4 percent of Canada's overall ethanol production in 2013.

Ethanol production in Canada will increase in 2013 to an expected 1,979 million liters, slightly up from 2012, and is forecast to grow further to 2,006 million liters in 2014. Due to the fact that this does not surpass the federal content requirement, which Post estimates as 2,269 million liters for 2013 and 2014, imports are expected to continue to increase to fulfill federal and provincial renewable content requirements. The national fuel ethanol production capacity for 2013 and 2014 is estimated at 1,802 million liters, and national capacity use is estimated at 99 percent in 2013, up from 96 percent in 2012 and only 75 percent in 2011. Primary feedstocks remain corn and wheat. However, small production levels of cellulosic ethanol from wood waste and municipal solid waste exist and are being developed by Enerkem. Atlantic Canada is also looking into future possibilities of cellulosic ethanol production, details of which will be announced in the near future.

Canada's limited biofuels 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. Cross-border trade between Canada and the United States in biofuels reflects the most economical trade corridors.

On July 1, 2011, the federal government implemented a federal mandate of two percent renewable content in diesel fuel and heating oil. The eastern part of Canada was initially given an implementation exemption until December 31, 2012, but on May 18, 2013, regulations Amending the Renewable Fuels Regulations were released, extending the exemption until June 30, 2013, as well as providing a permanent exemption from the mandate for heating oils. Some provincial mandates for renewable content are also in place, including a 4 percent requirement in British Columbia and 2 percent requirements in Alberta, Saskatchewan, and Manitoba. Ontario will soon be undertaking consultations regarding the creation of a mandate. At this time, Canada's biodiesel production, at an estimated 471 million liters in 2013, remains below Post's estimation of approximately 568 million liters needed to meet the federal standard (excluding heating oil) if it was in full effect in 2013. However, biodiesel production, due to the completion of new facilities, is expected to reach 646 million liters in 2014, surpassing production needed to supply the federal requirement. While production from soybean as a feedstock is expected to take place, primary feedstocks remain canola, animal fat, and recycled oils. Canola feedstock is expected to account for nearly 40 percent of Canadian biodiesel production by the end of 2014.

II. *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. According to the U.S. Energy Information Administration (EIA), Canada has the world's third largest proven oil reserves (estimated at 180 billion barrels), behind Venezuela and Saudi Arabia. Canada is one of the world's top ten oil exporters, and is one of the world's five largest energy producers.

While Canada is a significant producer of oil, it also ranks among the world's top ten consumers of petroleum. Between the years of 2006-2011 transportation accounted for about one-third of energy consumption (see Appendix I, Table 9), and motor gasoline and diesel fuel oil accounted for approximately 85 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 2006-2010 (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 a little under 55 percent (see Appendix I, Table 11).

A breakdown of energy use by fuel type reveals that gasoline and diesel fuel account for an average of 52 percent and 40 percent, respectively, of the fuel type used in the period 2006-2011 and now dominate as the transportation sector's main energy sources. Table 1 below illustrates current and past fuel consumption for 2006 through a forecasted 2014. Note that this excludes industrial power generation fuel use due to lack of availability. Table 2 illustrates Post's projections through 2023.

Table 1

Current and Past Fuel Use (million liters) (a)									
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013 (e)**	**2014 (f)**
Gasoline Total (c)	38,654	39,635	39,149	39,708	40,101	40,217	42,799	45,380	45,380
Diesel Total (d)	30,040	31,580	30,788	28,330	30,519	31,450	30,952	31,073	31,193
On-road	16,612	17,133	16,555	16,188	16,779	17,797	17,294	17,422	17,551
Agriculture	2,893	3,108	3,171	2,428	2,901	2,909	2,917	2,925	2,933
Construction /mining	3,484	3,823	3,955	3,795	4,551	4,553	4,764	4,975	5,185
Shipping/rail	3,647	3,735	3,781	2,635	3,231	3,178	3,058	2,937	2,817
Industry (g)	146	209	125	132	125	111	126	127	127
Heating (h)	3,258	3,572	3,201	3,152	2,932	2,901	2,794	2,687	2,580
Jet Fuel Total (i)	7,148	7,218	6,803	6,221	6,480	6,910	6,748	6,806	6,864
Total Fuel Markets	75,842	78,433	76,740	74,259	77,100	78,577	80,500	83,259	83,437

Notes & Sources

(a) 2006-2011 consumption based on data available on Statistics Canada's website and Natural Resources Canada's website
(b) 2012 data based on trend
(c) 2013-2014 gasoline consumption based on data from Hart Energy's World Refining & Fuels Service (WRFS)
(d) 2011-2014 consumption for all non-gasoline fuels based on trend
(e) Estimated
(f) Forecasted
(g) Industrial power generation fuel use available and projected from data from Statistics Canada (CANSIM Table 127-0004)
(h) Detailed data only available for residential sector
(i) Assumes use of Jet Fuel A and A-1 (source: Air BP's Handbook of Products) and excludes aviation gasoline

Table 2

Fuel Use Projections (million liters)

Calendar Year	2015	2016	2017	2018	2019	2020	2021	2022	2023
Gasoline Total (a)	45,260	44,924	44,588	44,252	43,916	43,580	43,104	42,628	42,152
Diesel Total	31,313	31,433	31,554	31,673	31,794	31,914	32,034	32,154	32,275
On-road	17,679	17,807	17,936	18,064	18,193	18,321	18,450	18,578	18,707
Agriculture	2,941	2,949	2,957	2,965	2,973	2,981	2,989	2,997	3,005
Construction /mining	5,396	5,606	5,817	6,028	6,238	6,449	6,659	6,870	7,081
Shipping/rail	2,697	2,577	2,457	2,336	2,216	2,096	1,976	1,856	1,735
Industry (c)	128	128	129	129	130	130	131	131	132
Heating (d)	2,473	2,365	2,258	2,151	2,044	1,937	1,829	1,722	1,615
Jet Fuel Total (e)	6,922	6,980	7,038	7,096	7,154	7,212	7,270	7,328	7,386
Total Fuel Markets	83,496	83,337	83,180	83,022	82,864	82,706	82,408	82,110	81,813

Notes & Sources

(a) Gasoline consumption based on data from Hart Energy's World Refining & Fuels Service (WRFS)
(b) Consumption for all non-gasoline fuels based on trend from Table 1
(c) Industrial power generation fuel use projected from Statistics Canada (CANSIM Table 127-0004)
(d) Detailed data only available for residential sector
(e) Assumes use of Jet Fuel A and A-1 (source: Air BP's Handbook of Products) and excludes aviation gasoline

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 were provided until December, 31, 2012, to give eastern Canada time to install biodiesel blending infrastructure. On May 18, 2013, the Regulations Amending the Renewable Fuels Regulations, were published in the Canada Gazette. The amendments extended the Maritime provincial exemption from the 2 percent renewable diesel requirement, increasing it to end on June 30, 2013. The amendments also created a permanent national exemption for the 2 percent renewable content requirement for heating oil. 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, and 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 3
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 (excluding heating oil).	Renewable fuel mandate for gasoline pool came into effect on December 15, 2010. Mandate for the distillate pool came into effect July 1, 2011 and must be met by June 30, 2013 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 helped 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 increased as producer investment increased, however a contribution cap of C$25 million applied; program was extended from March 31, 2011 to September 30, 2012 but is now expired.

Table 3 continues on next page…

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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.	Sought 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 has expired.
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 for the United States on projects geared to new agri-food, agriculture or bio-products; program closed on March 31, 2011.

Table 3 continues on next page…

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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**
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 Opportunities for Producers Initiative	C$20 million; Administered by Agriculture and Agri-food Canada; funding delivered through regional industry councils.	Direct payment, encourage producer ownership / involvement.	Provides financial assistance to 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 biofuel 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 4 summarizes the incentive measures that are currently in effect, and Appendix II provides detailed information:

Table 4

Renewable Fuels Standards, by Province		
	Renewable Content	
Province	Gasoline *(ethanol)*	Distillate *(biodiesel)*
British Columbia	5%	4%
Alberta	5%	2%
Saskatchewan	7.5%	2%
Manitoba	8.5%	2%
Ontario	5%	In discussion*

Source- Canadian Renewable Fuels Association
*See Appendix II, Ontario Biofuel Policies

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 within the province. 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 were 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.

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).

III. Ethanol

Note: This section refers only to conventional/first generation biofuels.

Table 5

Ethanol Used as Fuel and Other Industrial Chemicals (Million Liters)

Calendar Year	2006	2007	2008	2009	2010	2011	2012	2013 (e)	2014 (f)
Beginning Stocks	577	23	149	178	171	216	446	787	893
Fuel Begin Stocks									
Production (a)	312	740	950	1,071	1,346	1,505	1,902	1,979	2,006
Fuel Production	212	640	850	951	1,196	1,345	1,725	1,785	1,795
Imports (b)	101	554	595	297	554	1,008	1,087	1,144	1,216
Fuel Imports	84	478	530	269	502	926	1,005	1,067	1,134
Exports (b)	57	59	55	75	94	81	62	47	31
Fuel Exports	39	51	49	67	84	72	56	42	28
Consumption (c)	910	1,090	1,460	1,600	1,820	2,203	2,586	2,970	2,970
Fuel Consumption	760	940	1,300	1,450	1,650	2,023	2,396	2,770	2,770
Ending Stocks (d)	23	149	178	171	216	446	787	893	1,114
Fuel Ending Stocks									
Production Capacity (Fuel Ethanol Only)									
Number of Refineries		10	12	13	14	15	14	15	15
Nameplate Capacity	340	850	1,135	1,265	1,590	1,790	1,791	1,802	1,802
Capacity Use (%)	62%	75%	75%	75%	75%	75%	96%	99%	100%
Co-product Production (1,000 MT)									
Distiller Dried Grains (DDGs)				736	923	1,037	1,329	1,375	1,383
Corn Oil				46	63	74	96	99	99
Feedstock Use (1,000 MT)									
Corn				1,582	2,180	2,543	3,307	3,422	3,422
Wheat				770	770	770	940	972	997

Table 4 continues on next page…

Market Penetration (Million Liters)

Fuel Ethanol	760	940	1,300	1,450	1,650	2,023	2,396	2,770	2,770
Gasoline	38,654	39,635	39,149	39,708	40,101	40,217	42,799	45,380	45,380
Blend Rate (%)	2.0%	2.4%	3.3%	3.7%	4.1%	5.0%	5.6%	6.1%	6.1%

(a) 2006-2010 Production data based on information from F.O.Licht. 2011-2014 Fuel ethanol production based on data from Canadian Renewable Fuels Association along with industry discussion, and overall ethanol production based on fuel ethanol:all ethanol ratio from 2006-2010.
(b) Trade data based on information from F.O.Licht and the Global Trade Atlas. Ethanol is harmonized under HS code 2207.10 and 2207.20. GTA reports Canadian ethanol trade as LPA, and no official statistics are available in liters. Fuel ethanol proportion of trade based on proportions of fuel ethanol in consumption and production.
(c) Consumption data based on information from F.O.Licht, Statistics Canada, and federal/provincial Renewable Fuel Standards.
(d) Ending stocks only available for 2006-2010 from F.O.Licht. Stocks for all other years are based on calculations of Canadian trade balances.
(e) Estimated
(f) Forecasted

A. Production

Bioethanol production in Canada will increase by approximately 4 percent in 2013, due in part to a new plant, which came online this past January (Growing Power Hairy Hill, see Table 22, Appendix III). Ethanol production is estimated to increase to 1,979 million liters, up from the estimated 1,902 million liters in 2012; more specifically, fuel ethanol production is estimated to increase to 1,785 million liters in 2013, up from 1,725 million liters in 2012. Production is forecast to grow slightly further to 2,006 million liters in 2014, due to plants running at a higher percentage of nameplate capacity. Factors most affecting changes in production will include gasoline prices, technological improvements and the impact of federal and provincial mandates.

In 2013, it is estimated that 78 percent of the domestic production of domestic ethanol will be derived from corn, and 21 percent will be derived from wheat. Post forecasts that this will likely remain relatively stable throughout 2014, but there is possibility for further growth of corn as a feedstock; some plants are converting from wheat to corn as a feedstock due to the lower price and higher availability. 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 2013, Ontario alone is estimated to account for 58 percent of current domestic bioethanol production capacity. Saskatchewan is estimated to account for 19 percent, Quebec is estimated to account for 10 percent, and Alberta and Manitoba combined are estimated to account for 12.7 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 unlikely to change in the

short to medium term as Canada is still working towards building enough production capacity to meet its own domestic mandates.

B. Impacts of Ethanol 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.

i. Ethanol Produced from Corn

Corn remains the main feedstock for Canadian bioethanol production, and Ontario remains the largest corn-producing province in Canada. In 2013 and 2014, corn is expected to account for about 78 percent of bioethanol feedstock, respectively.

ii. Ethanol Produced from Wheat

Wheat is the feedstock for most of the balance of Canada's bioethanol production. It is forecast to account for about 22 percent of bioethanol feedstock for years 2013 and 2014. 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. For example, the Husky Energy 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 were removed with the December 15, 2011 decision by Canadian legislators to pass into law the divisive Marketing Freedom for Grain Farmers Act. This Act has transitioned the Canadian Wheat Board (CWB) from a state trading enterprise into a commercial enterprise. Prior to the August 1, 2012 enactment date, the CWB had the exclusive right to purchase

and sell western wheat (and barley) for domestic food use or export for the 70 years. However, since the CWB was never very involved in bioethanol production, it is unlikely that this change will have an effect on wheat-based bioethanol production.

C. Consumption

Based on the trend of net national sales of gasoline used for road motor vehicles between 2006 and 2011, and the projected trend for 2011-2014 (see Table 6, below), the federal mandate of 5 percent renewable fuel content requires an estimated minimum of 2,269 million liters for 2013 and 2014 of ethanol production — not just capacity. Production capacity of bioethanol is not expected to surpass 1,802 million liters in 2013 and 2014 (see Table 21, Appendix III).

Table 6

Canada: Sales of Gasoline Used for Road Motor Vehicles

in million liters

	2006	2007	2008	2009	2010	2011	2012	2013 (e)	2014 (f)
Net sales of gasoline	38,654	39,635	39,149	39,708	40,101	40,217	42,799	45,380	45,380

Notes & Sources

(a) 2006-2011 consumption based on data available on Statistics Canada's website and Natural Resources Canada's website
(b) 2012 data based on trend
(c) 2013-2014 gasoline consumption based on data from Hart Energy's World Refining & Fuels Service (WRFS)
(e) Estimated
(f) Forecasted

D. Trade

While there are few reliable trade statistics for Canada's fuel ethanol due to broad and changing HS codes, Post forecasts that imports will rise to 1,144 and 1,216 million liters per year for 2013 and 2014, respectively, up from an estimated 1,087 million liters in 2012. This increase is expected to be driven by an increasing demand for ethanol because of mandates and industry's inability to produce the required amount of ethanol. Exports are expected to decrease between 2013 and 2014. This decrease will most likely be due to the need for Canada to meet its own domestic mandates.

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.

In recent years, nearly 100 percent bioethanol trade for Canada has been 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.

E. Ending Stocks

Due to a relative lack in data availability for stocks, stock data is mostly calculated based on estimated trade balances. The high stocks listed for more recent years in Table 5 may, however, be put toward consumption in order to meet mandated renewable content levels.

IV. Biodiesel

Note: This section refers only to conventional/first generation biofuels.

Table 7

Biodiesel (Million Liters)									
Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013 (e)**	**2014 (f)**
Beginning Stocks (a)	400	452	550	521	516	528	185	49	93
Production (b)	48	95	95	148	170	185	210	471	646
Imports (c)	61	73	13	21	144	18	434	439	439
Exports (c)	0	11	69	60	71	108	102	153	250
Consumption (d)	57	59	68	114	231	438	678	713	721
Ending Stocks (g)	452	550	521	516	528	185	49	93	207
Production Capacity (h)									
Number of Biorefineries	3	3	4	5	9	10	9	12	12
Nameplate Capacity	102	102	118	165	186	207	258	759	759
Capacity Use (%)	47.1%	93.1%	80.5%	89.7%	91.4%	89.4%	81.4%	62.1%	85.1%
Feedstock Use (1,000 MT)									
Canola	1	1	1	20	25	25	31	151	232
Animal Fat	45	90	90	90	95	105	98	111	129
Recycled Oils	0	0	0	30	40	45	69	114	157
Soybean	0	0	0	0	0	0	0	57	75
Market Penetration (Liters - specify unit)									
Biodiesel, on-road use	32	32	37	65	127	248	379	400	406
Diesel, on-road use (i)	16,612	17,133	16,555	16,188	16,779	17,797	17,294	17,422	17,551
Blend Rate (%)	0.2%	0.2%	0.2%	0.4%	0.8%	1.4%	2.2%	2.3%	2.3%
Biodiesel, total use (j)	57	59	68	114	231	438	678	713	721
Diesel, total use (i) (j)	26,782	28,008	27,587	25,178	27,587	28,549	28,158	28,386	28,613
Blend Rate (%) (j)	0.2%	0.2%	0.2%	0.5%	0.8%	1.5%	2.4%	2.5%	2.5%
Diesel, total use (i) (j)	30,040	31,580	30,788	28,330	30,519	31,450	30,952	31,073	31,193

Table 7 continued on next page…

(a) Stock data unavailable, included to ensure proper trade balances in following years
(b) Production numbers based on industry discussion.
(c) Trade data availability before 2012 is very limited. Trade numbers before 2012 compiled based on a conglomeration of industry discussion, United States Department of Commerce data, and Natural Resources Canada data. Biodiesel trade for 2012 and 2013 is harmonized under HS Codes 3826.00 (assumed to be B100

diesel fuel oil) and 2710.20 (assumed to be B5 diesel fuel oil).
(d) Biodiesel consumption for each year based on provincial and federal renewable fuel mandates and data from Statistics Canada.
(e) Estimated
(f) Forecasted
(g) Data availability for diesel and biodiesel ending stocks is virtually nonexistent. Stock numbers estimated to ensure correct trade balance for each year.
(h) Production capacities and plant specifics based on industry discussion.
(i) Diesel fuel comsuption data derived and projected from data from Statistics Canada.
(j) Excluding consumption in heating sector. This is due to the recent development that heating oil will be exempted from federal renewable content requirements.

A. 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) as well as for renewable content in heating distillate oil. Temporary exemptions for renewable content in diesel fuel and heating distillate oil sold in Quebec and all Atlantic provinces have been extended, until June 30, 2013 to give Eastern Canada time to install biodiesel blending infrastructure. This announcement, in combination with the extension of the ecoABC Initiative (a program which assisted in the construction of biofuel facilities that have a minimum of five percent producer investment) which was extended until September of 2012, is likely to help spur investment in biodiesel production facilities. With the ecoABC Initiative and forecasted increased production, industry is preparing to comply with the mandated requirements.

Biodiesel production is projected to more than double in 2013 to 471 million liters, up from an estimated 210 million in 2012, due to new production capacity. In 2014, production is forecast to increase even further to 646 million liters, partially due to the expected completion of a 265 million liter plant. In the longer term, the European Union's (EU) 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 the end of 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.

B. 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 likely to be considered. Canola, largely due to the abundance of the Canadian production, has proven to be the natural feedstock choice. Projected canola-based biodiesel production shows increases from 151 million liters (35 percent production share) in 2013 to 232 million liters (39 percent share) 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 responded by planting record acreage, up 13 percent from an already record 2011 year. In 2013, area seeded to canola is estimated to have fallen 8 percent from the previous year, but remains at a historically high level. Despite the supply response of recent years, 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 potentially supply the vast majority of the federal 2 percent biodiesel mandate), combined with provincial biodiesel mandates may make the industry profitable, despite higher commodity prices.

In 2014, while the amount of tallow used for biodiesel is forecast to increase by 16 percent, the share of biodiesel production from tallow (animal fats) is expected to decrease from estimated 2013 levels of 26 percent to 22 percent due to completion of new biodiesel plants using other feedstocks. The share of biodiesel produced from yellow grease is forecast to fall to remain relatively steady at 26 percent of production.

C. Consumption

Based on the trend of net national sales of diesel used for road motor vehicles between 2006 and 2011 (see Table 1, above), and the federal mandate which includes renewable fuel content in both the diesel oil sales for transportation as well other sectors, Post estimates that Canada will consume 713 million liters of biodiesel in 2013 and forecasts consumption at 721 million liters of biodiesel production in 2014 (see Table 7, above). By the end of 2014, the temporary exemptions for eastern Canada and Quebec will have been lifted, the compliance period will have ended, and the full federal mandate should be in force.

D. Biodiesel Trade

Trade data for biodiesel is problematic since Canada did not have an established HS code for biodiesel until 2012. 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 from before 2012 used in this report is therefore based on a conglomeration of industry discussion, United States Department of Commerce data, Natural Resources Canada data, and Global Trade Atlas data. 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 become less necessary over the next few years as production capacity grows and fulfills more of the federal and provincial mandates. Thus, import amounts are expected to level out in 2013 to 2014. However, this is subject to considerable variation depending on the amount of actual production, which fluctuates due to changing capacity use. Exports are expected to increase in 2013-2014 as U.S. demand for biodiesel increases.

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

E. Ending Stocks

There are no official statistics kept on biodiesel stocks, so Post has estimated stocks based on trade balance calculations. However the biodiesel forecast to be put toward stocks could instead be exported or put toward domestic consumption, depending on Canadian need to meet the mandated renewable content levels.

V. *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 100,000 dry metric tons of municipal solid waste to the plant as feedstock. The plant is expected to be operational in early 2014. 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.

There is also Atlantic Canadian interest in producing cellulosic from wood waste or other advanced feedstock. For more information, please see the below section regarding biofuels in Atlantic Canada.

According to the Canada Gazette, as of February 26, 2011, some biodiesel producers may be considering the possibility of renovating existing refineries in order to produce hydrotreated vegetable oil (HVO). These considerations are attributable to some substantial advantages that HVO has over biodiesel, including higher energy content, no need for temperature regulation during transportation, and significant convenience for blenders due to the chemical equivalence to diesel. However, HVO is currently less economic than biodiesel, resulting in less Canadian demand. There are currently no domestic HVO production facilities, and any intentions to start-up such facilities are not expected to be fulfilled in the near future.

Although recent data from F.O.Licht has shown relatively little domestic consumption of HVO, there has been some demand which has, in recent years, pushed imports of HVO to levels comparable to imports of biodiesel.

VI. 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 EU has been increasing funding for renewable energy production, including doubling the financial allotment of funds to renewable energy in 2007. In 2004, the EU announced that by 2020, 20 percent of its total energy consumption requirements will be renewable energy sources, greatly higher than the 12.4 percent in 2010. The pellet industry in Canada, especially in the west, has grown rapidly. According to the Canadian Wood Pellet Association (WPAC), 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 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.

Canadian pellet consumption has remained relatively steady throughout the past several years, and there are no official statistics reflecting possible increases. However, a report released by the WPAC notes that demand for wood pellets may increase in the coming years due to Canadian desire to reduce carbon emissions in the coming years. The targeted reductions would require about 14 million tones of wood pellets to replace coal by 2020. While this desire remains somewhat impractical, Post estimates that 2013 and 2014 will show consumption increases, while not as large as mentioned above, that will reflect rising demand.

Table 8

Wood Pellets (1,000 MT)

Calendar Year	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013 (e)**	**2014 (f)**
Beginning Stocks	0	0	0	0	1	1	0	443	1,512
Production	1,145	1,485	1,335	1,300	1,320	1,934	2,000	2,540	3,226
Imports	0	0	0	40	0	0	45	29	12
Exports	1,055	1,390	1,240	1,244	1,225	1,870	1,369	1,739	2,209
Consumption	90	95	95	95	95	65	233	400	690
Ending Stocks (a)	0	0	0	1	1	0	443	873	1,851
Production Capacity									
Number of Plants (b)			25	29	33	37	42	46	46

Nameplate Capacity			1,400	1,700	2,000	2,931	3,000	3,707	3,707
Capacity Use (%)			95.4 %	76.5 %	66.0 %	66.0 %	66.7 %	68.5 %	87.0 %

Data based on available information from the Canadian Wood Pellet Association and Statistics Canada. All other data estimated based on trend.
(a) No official stock data available. Stocks assumed to reflect trade balance. Wood pellet stock in 2013 and 2014 may be put toward consumption or export depending on Canadian and European future demand.
(b)Plant information regarding number of plants and capacity unavailable before 2008.

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 beginning of 2014. It is expected to have a production capacity of 38 million liters of ethanol per year.

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 from AVAC Ltd. 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							
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**10/11 Change**
Residential	1,280	1,399	1,400	1,321	1,265	1,352	6.88%
Commercial	1,047	1,097	1,110	1,049	1,027	1,088	5.94%
Industrial	2,302	2,433	2,392	2,231	2,351	2,440	3.79%
Transportation	2,494	2,594	2,585	2,531	2,619	2,634	0.05%
Agriculture	229	238	243	211	245	272	11.02%
Public Administration	131	126	127	123	119	123	3.36%
Total	7,513	7,915	7,886	7,490	7,654	7,945	3.80%
Source: Statistics Canada							

Table 10					
Transportation Sector Energy Use by Source in petajoules					
	2006	**2007**	**2008**	**2009**	**2010***
Total Energy Use	2,457	2,555	2,542	2,507	2,595
Electricity	4	3	2	2	3
Natural Gas	2	2	2	2	2
Motor Gasoline	1,370	1,393	1,375	1,395	1,407
Diesel Fuel Oil	740	772	789	751	812
Light Fuel Oil and Kerosene	0	0	0	0	0
Heavy Fuel Oil	69	84	85	86	84
Aviation Gasoline	3	3	3	3	3
Aviation Turbo Fuel	252	254	240	219	228
Propane	11	12	13	11	11
Shares (%)	**2006**	**2007**	**2008**	**2009**	**2010**
Electricity	0.1%	0.1%	0.1%	0.1%	0.1%
Natural Gas	0.1%	0.1%	0.1%	0.1%	0.1%
Table 10 continues on next page…					
Motor Gasoline	55.8%	54.5%	54.1%	55.6%	54.2%

Diesel Fuel Oil	30.1%	30.2%	31.1%	30.0%	31.3%
Light Fuel Oil and Kerosene	0.0%	0.0%	0.0%	0.0%	0.0%
Heavy Fuel Oil	2.8%	3.3%	3.3%	3.4%	3.2%
Aviation Gasoline	0.1%	0.1%	0.1%	0.1%	0.1%
Aviation Turbo Fuel	10.2%	10.0%	9.4%	8.7%	8.8%
Propane	0.5%	0.5%	0.5%	0.4%	0.4%
* year 2010 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

	2006	**2007**	**2008**	**2009**	**2010**
Total Energy Use	2,457	2,555	2,542	2,507	2,595
Freight	1,005	1,053	1,064	1,038	1,101
Passenger	1,352	1,400	1,376	1,377	1,390
Off road	100	102	102	92	104
Shares (%)	**2006**	**2007**	**2008**	**2009**	**2010**
Freight	41%	41%	42%	41%	42%
Passenger	55%	55%	54%	55%	54%
Off road	4%	4%	4%	4%	4%

* year 2010 is the year for which the most recent data is available

Source: Office of Energy , Natural Resources Canada

Appendix II

Provincial Mandates, Policies, Tax Exemptions, Incentives and Conditions

A. Alberta Biofuel 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 13, the province of Alberta offered a Bioenergy producer credit program (PCP). It was, however, announced in Alberta's Budget 2013 that future rounds of the PCP have been discontinued.

Context:
According to the most recent data, Alberta boasts approximately 11 percent of Canada's total population, 14 percent of net gasoline sales and 6.5 percent of bioethanol production capacity.

Table 12		
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 totalling approximately $150 million. These two programs are no longer accepting applications.	
Administering Ministry	Alberta Energy	
Table 12 continued on following 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 13

Alberta: Provincial 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 percent bioethanol.	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 $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.	Duration: The current credit program runs from April 1, 2007 – March 31, 2011. The PCP was discontinued in 2013, but existing BPCP commitments are still being honored. Alberta's current bioenergy program treats all bioethanol equally. The extended program focuses on the great potential for 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.

B. 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 14

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, C$400,000 to Cedar Road, C$100,000 investment in University of British Columbia's Clean Energy Research Centre (CERC), and a C$135,000 investment in a Wood Pellet Association of Canada Torrefaction Technology Study.*
Liquid Biofuels Program	C$ 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.*
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.*

Context:

According to the most recent data, British Columbia boasts approximately 13.1 percent of Canada's total population, 11 percent of net gasoline sales and virtually no commercial bioethanol production capacity.

Table 15

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

C. *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 4 percent of Canada's total population, 4 percent of net gasoline sales and 7 percent of bioethanol production capacity.

Table 16

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.

D. 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.

While Ontario currently has no regulations for a provincial renewable diesel requirement, it was announced on May 2, 2013, that the government will undertake a formal consultation on the creation of a renewable diesel mandate. The CRFA recommended a 2 percent biodiesel mandate for Ontario, but upcoming consultations will determine the details of the potential mandate. For updates on the regulations, visit http://www.greenfuels.org/en.aspx.

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 38 percent of Canada's total population, 39 percent of net gasoline sales and 58 percent of bioethanol production capacity.

Table 17

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	None

	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).	

E. Quebec Biofuel Policies

Biofuels Strategy/Policy Documents:
Quebec currently has no mandate in place for renewable fuel content in gasoline. However, it contributes to national compliance with the federal Renwable Fuels Regulations.

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 USD$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 USD$65 a barrel. More information is available on the web site of Revenue Quebec.

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 currently constructing its waste-to-biofuels plant in Edmonton, AB, Canada, which has received over 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, 21 percent of net gasoline sales and 10 percent of bioethanol production capacity.

Table 18

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

Mandate	Incentives	Conditions/Duration
None	Tax Credit Refund On April 21, 2005, the 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.	Tax credit is limited to a maximum bioethanol production credit of 126 million liters and *no tax credit is given for the month in which the average monthly price of crude oil is equal to or greater than USD$65 a barrel or the total cumulative production of bioethanol exceeds 1.2 billion liters*. Duration: April 1, 2006 - March 18, 2018

F. 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. The program provided a 15 cent per liter grant to eligible distributors who blend Saskatchewan produced ethanol for domestic consumption. A program review indicated that the objectives of the program have been largely met, and a phase out program started April 1, 2013. This reduced the grant from 15 cents per liter to 10 cents per liter with an annual cost of $16 million (down from $24 million).

Enterprise Saskatchewan administers the Saskatchewan Bioethanol Program.

Table 19

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, ended 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 20		
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.

G. Biofuel Policies in Atlantic Canada

Biofuels Strategy/Policy Documents:
Biomass developments are increasing in Atlantic Canada. The Atlantic Council for Bioenergy Co-operative (ACBC) was founded in 2010 with the vision of bringing a vibrant, sustainable bioenergy industry to Atlantic Canada. While Atlantic Canada may lack the arable area for traditional biofuels feedstock, options are being explored in the realm of cellulosic ethanol and renewable diesel via wood waste and other advanced feedstock. Although, little information is available currently, an ACBC media conference will be held in early July, 2013 to discuss and announce plans to develop a thriving renewable energy supply in Atlantic Canada. This information will be posted on ACBC's website shortly thereafter.

Currently, however, 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 21

Ethanol Production Plants: Existing, Expanding, Under Construction				
Status	**Location**	**Company Name**	**Primary Feedstock**	**Nameplate Capacity (million liters)**
Existing	Westbury, Quebec	Enerkem	Wood waste	5
Existing	Lanigan, Saskatchewan	Pound-Maker	Wheat	15
Existing	Weyburn, Saskatchewan	NorAmera Bioenergy	Wheat, corn	25
Existing	Unity, Saskatchewan	North West Terminal Ltd.	Wheat	25
Existing	Tiverton, Ontario	GreenField Ethanol	Corn	27
Under construction	Edmonton, Alberta	Enerkem	Municipal landfill waste	38
Existing	Hairy Hill, Alberta	Growing Power Hairy Hill	Wheat	40
Existing	Red Deer, Alberta	Permolex	Wheat	42
Existing	Havelock, Ontario	Kawartha Ethanol	corn	80
Existing	Minnedosa, Manitoba	Husky Energy	Corn, wheat	130
Existing	Lloydminster, Saskatchewan	Husky Energy	Wheat	130
Existing	Aylmer, Ontario	IGPC	Corn	172
Existing	Belle Plaine, Saskatchewan	Terra Grain Fuels	Wheat, corn	150
Existing	Varennes, Quebec	GreenField Ethanol	Corn	175
Existing	Chatham, Ontario	GreenField Ethanol	Corn	195
Existing	Johnstown, Ontario	GreenField Ethanol	Corn	200
Existing	Sarnia, Ontario	Suncor Energy	Corn	396
			TOTAL:	1,845

Source: Attempted to contact each respective company. Cross-checked data with Canadian Renewable

Fuels Association and the Global Biofuels Center; forecasted production capacity for 2014.

Table 22

Biodiesel Production Plants: Existing, Expanding, Under Construction				
Status	**Location**	**Company Name**	**Feedstock**	**Nameplate Capacity (million liters)**
Existing	Mississauga, Ontario	Methes Energies Canada	Recycled oils	5
Existing	Springfield, Ontario	Noroxel (Methes Energies)	Recycled oils	5
Existing	St-Jean d'Iberville, Quebec	QFI Biodiesel (Methes Energies)	Recycled oils	5
Existing	Sombra, Ontario	Methes Energies Canada	Recycled oils	50
Existing	Delta, BC	Consolidated Biofuels	Yellow grease	11
Existing	Foam Lake, Saskatchewan	Milligan Bio-tech	Canola oil	20
Existing	Montreal, Quebec	Rothsay	Animal fats, recycled oils	45
Existing	Delta, BC	City-Farm Biofuel Ltd.	Recycled oil/tallow	50
Existing	Lethbridge, Alberta	Kyoto Fuels	Animal fats, recycled oils	66
Existing	Hamilton, Ontario	BIOX Corporation	Animal fats, yellow grease	67
Existing	Welland, Ontario	Great Lakes Biodiesel	Canola, soybean	170
Coming Online Fall of 2013	(West) Lloydminister, Alberta	Archer Daniels Midland	Canola	265
			TOTAL:	759

Source: Attempted to contact each respective company. Cross-checked data with Canadian Renewable Fuels Association and the Global Biofuels Center; forecasted production capacity for 2014