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Canada Biofuels Annual

Canada Biofuels Annual

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Report Highlights:

Canada will soon implement a long-debated federal mandate of five percent of the gasoline pool by September 1, 2010, and two percent of diesel fuel to be renewable by 2012. Bioethanol production in Canada is projected to remain fairly constant at 1,360 million liters in 2010, compared to 1,348 million liters in 2009 as a result of construction delays. Bioethanol production in 2011 is forecast at 1,400 million liters. Corn and wheat remain the largest sources of feedstock. In 2010 total bioethanol production capacity is forecast at 2,044 million liters, up about 30 percent in five years. Biodiesel is projected to increase slightly in 2010 up to 190 million liters from 187 million in 2009, and production is forecast to rise again to 195 million liters in 2011. Additionally, the European Union's increased demands for renewable energy has generated a growing market for wood pellet exports within Canada resulting in the expansion of old plants and creating new production facilities. Canada's export of wood pellets increased to 1.3 million tons in 2009 and the share to Europe jumped from about 30 percent in 2006 to 52 percent in 2009. However, Canada's limited biofuel production capacity, both in the short and medium term, suggests that Canada will not soon be a major player in the global biofuels market.

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Executive Summary

Canada's proposed federal mandate will create a national Renewable Fuels Standards (RFS), but many provinces already have higher provincial mandates in place. Half of bioethanol production occurs in three provinces, all with provincial mandates: 7.5 percent of fuel must be bioethanol in Saskatchewan, 5 percent in Ontario and 8.8 percent in Manitoba. British Columbia and Alberta account for a quarter of net gasoline sales in Canada and are scheduled to implement 5 percent renewable fuel mandates in 2011. Quebec (20 percent of net gasoline sales) expects 5 percent of its gasoline content be renewable fuels by 2012.

National bioethanol production is forecast to decrease remain fairly constant at 1,360 million liters 2010 compared to 1,348 million liters in 2009, and projected to increase again only slightly in 2011 to 1,400 million liters, well below the 1,900 million liters federal government's target. However, capacity is expected to increase 5 percent from 2009 level of 1,931 million liters to 2,044 million liters in 2010. Bioethanol feedstocks remain largely corn and wheat.

Canada's biodiesel industry remains far from the 600 million liters of biodiesel required to meet the two percent federal mandate to take effect in 2012. In 2010, domestic production of biodiesel is forecast to reach 190 million liters, a two percent increase over the 2009 capacity of 187 million liters.

Canada's limited bio-fuel production, both in the short and medium term, suggests that Canada will not soon become a major player in the global bioethanol market. While the possibility of increased bioethanol trade, especially between the northwest United States and Western Canada (wheat-derived bioethanol from Canada to the United States and corn-based bioethanol from the United States to Canada), there is an increasing amount of trade in the co-products of bioethanol production.

Wood pellet production is increasing quickly, with 80 percent of the production exported to United States and European Union consumers. In 2009, Canada exported 1.34 million tons of wood pellets globally, up 6 percent from 1.26 million tons in 2008. As the European Commission increases their commitment to renewable energy consumption, Canada has great potential to expand wood pellet production with their increasing renewable energy market.

Policy and Programs:

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 have encouraged the development of a Canadian renewable fuels industry. A [Notice of Intent](#) was published in the Canada Gazette Part 1 on December 30, 2006, detailing the federal regulations requiring renewable fuels. The proposed Renewable Fuels Regulations are a key element of the Government's Renewable Fuels Strategy.

The overall structure is similar to the Renewable Fuel Standard in the United States, with the point of compliance being the point of production or importation. The objective of the proposed regulations is to reduce green house gas (GHG) emissions by mandating an average 5 percent renewable fuel content based on the gasoline volume, thereby contributing towards the protection of Canadians and the environment from the impacts of climate change. The proposed 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 proposed regulations fulfill the commitments under the Renewable Fuels Strategy of reducing GHG emissions from liquid petroleum fuels and creating a demand for renewable fuels in Canada.

On April 17, 2010, the Government of Canada pre-published in the Canada Gazette Part I of the [Regulatory Impact Analysis Statement \(RIAS\)](#) assessing the economic effects of the RFS, the final step prior to the implementation of the regulations on September 1, 2010. Although the comments are not yet published, there is debate surrounding the draft RFS, mainly concerning the accuracy of the RIAS cost/benefit evaluation.

Some of the viewpoints of key groups;

Representatives from the [Canadian Renewable Fuels Association](#) (CRFA) urge the Canadian government to maintain and expand support for the biofuels industry and accelerate implementation and enforcement of a national renewable fuels standard. CRFA disagrees with the government's analysis of the proposed regulation in the RIAS which suggests that over a 25-year period, the RFS regulations will cost Canadians \$2.68 billion, as a CRFA [analysis](#) concluded that the expected net benefit to Canadians can be estimated closer to \$2.9-\$4 billion.

The [Pembina Institute](#) believes that the RIAS overestimates the emission reductions, and to correct for this the Government of Canada must omit indirect land use change out of its calculations.

[Green Field Bioethanol](#), the largest bioethanol producer in the region is supportive of the RFS conclusions citing that the Canadian Renewable Fuel Standard will be the equivalent of removing a million cars from the road and will reduce Greenhouse Gas emissions by reducing 4.2 mega tons of CO₂ from the cars we drive.

[Environment Canada](#) agreed that the federal regulation will bring benefits to increase

renewable fuels and reducing about four million tons of greenhouse gases each and every year, but conceded that the effects of renewable fuels on other vehicle emissions are mixed – some pollutants can increase, others will decrease.

The regulations may be modified based on the comments received before June 9, 2010, (the end of a 60-day open comments period), but some version of the regulations must be enforced on September 1, 2010. The first gasoline compliance period is the period from September 1, 2010 to December 31, 2011 (a 16-month period), during which time producers must average 5 percent renewable fuel in the gasoline pool.

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

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.

Table 1 Federal Programs to Promote a Domestic Renewable Fuels Industry			
Program Name	Budget Allocated / Administering Ministry or Agency	Type of Program	Program Design / Duration
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

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Table 1, continued			
Federal Programs to Promote a Domestic Renewable Fuels Industry			
Program Name	Budget Allocated/ Administering Ministry or Agency	Type of Program	Program Design / Duration
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; In effect April 1, 2007 - March 31, 2011
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 runs April 2006 - March 31, 2011

Table continued on next page.

Table 1, continued			
Federal Programs to Promote a Domestic Renewable Fuels Industry			
Program Name	Budget Allocated/ Administering Ministry or Agency	Type of Program	Program Design/Duration
<u>NextGen Biofuels Fund</u>	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 runs April 2006 - March 31, 2011
<u>Biofuels Opportunities for Producers Initiative</u>	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; Closed on March 31, 2008

Cap-And-Trade Research

The University of Guelph is currently evaluating a cap and trade system for Ontario. In Alberta, a Green Fund and an Offset System already exist to allow large emitters to purchase carbon credits from farmers, and a law enacted in Saskatchewan in late April 2010 would allow the purchase of carbon credits from farmers there. Provincial governments in Ontario, Quebec, Manitoba and British Columbia are discussing a protocol under the Western Climate Initiative. To date, the Chicago Climate Exchange is a voluntary market with more supply of carbon credits than demand, making them worth about \$2/ton of sequestered carbon. In Alberta, carbon credits are trading at \$13/ton while in Europe, their value ranges from \$20 to \$30/ton. Future policy debates will focus on who claims the credits.

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). In its Notice of Intent, the federal government makes 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 will result in a renewable fuel standard for diesel fuel that will likely come into force ahead of the federal biodiesel mandate. Table 2 summarizes the incentive measures that are currently in effect and Appendix I provides detailed information:

Table 2		
Renewable Fuels Standards, by Province		
Renewable Content		
Province	Gasoline (<i>bioethanol</i>)	Distillate (<i>biodiesel</i>)
British Columbia		<u>3-5%*</u>
Alberta	<u>5%**</u>	<u>2%**</u>
Saskatchewan	<u>7.5%</u>	
Manitoba	<u>8.5%</u>	<u>2%</u>
Ontario	<u>5%</u>	
Quebec	<u>5%***</u>	
New Brunswick	<u>5%****</u>	<u>2%*****</u>

* Increase from 3 % to 5% by 2012
**In April 2011
***Target by 2012, from advanced renewable fuels
****Possible target in co-operation with the federal government
Source-Canadian Renewable Fuels Association

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 build up 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. The proposed regulations will impact the industry, depending on the changes made between now and the September 1 implementation date.

Bioethanol and Biodiesel:

A. 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 bioethanol industry. Canada has the world's second largest proven oil reserves (estimated at 179.2 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 quarter of energy consumption, whereas motor gasoline and diesel fuel oil accounted for 87 percent of the energy used (see Appendix II, Table 25). Based on data from the U.S. Department of Energy, Canada decreased its consumption of petroleum in 2009. A closer look at the use of energy within the transportation industry shows that on average for the last seven years, the share of energy used for freight averaged 40 percent per year and the share of energy used for passenger transportation averaged 56 percent. A breakdown of transportation energy use by fuel type reveals that gasoline and diesel fuel account for an average of 56 percent and 30 percent, respectively, of the fuel type used in the period 2003-2007, and dominate as the transportation sector's main energy sources (see Appendix II, Table 22).

Table 3						
Canada: Sales of Fuel Used for Road Motor Vehicles						
	in million liters					
	2004	2005	2006	2007	2008	Average
Net sales of gasoline	38,912	38,484	38,654	39,640	39,208	38,978
Net sales of diesel oil	15,671	16,216	16,612	17,196	16,358	16,411
Source: Statistics Canada						

B. Bioethanol

i. Bioethanol Production

Bioethanol production in Canada is projected to remain fairly constant in 2010 at 1,360 million liters, compared to 1,348 million liters in 2009 as a result of construction delays. Imports and exports of ethanol are forecasted to remain stable, and corn and what remain the largest source of feedstock. Factors most effecting changes in production will include gasoline prices, technological improvements and the impact of federal and provincial mandates.

Should the projects under construction be realized, Canadian production is forecast to reach 1,360 million liters (see Table 4) million liters by the end of 2010, a production level that would not meet the government of Canada's target of 1,900 million liters. Production numbers indicate that in 2010 Canadian national production is estimated at 67 percent of national capacity compared to 69 percent in 2009, but an increase from 63 percent in 2008, and a large increase from 50 percent in 2007.

Current bioethanol capacity by the end of 2010 is expected to increase only slightly from 2009 levels due to several construction plans for bioethanol plants being delayed until oil prices recover and the world economy improves. Production capacity is expected to reach 2,044 million liters in 2010, a 5.9 percent increase compared to 2009 (1,931 million liters). The expected increase is due to anticipated capacity from the Greenfield Hensall plant (200 million liters annual capacity) which is currently under construction.

Based on the trend of net sales of gasoline used for road motor vehicles between 2005-2008 (see Table 3 above), a federal mandate of 5 percent renewable fuel content would require a minimum of 1,900 million liters production, not just capacity.

In 2010, it is estimated that 64 percent of the production of domestic bioethanol will be derived from corn, 35 percent from wheat and 1 percent from "other" feedstock such as wood waste and wheat straw. Post forecasts that this will likely change to 68 percent corn, 31 percent wheat and 1 percent "other" feedstock for 2011. 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 2010, Ontario alone is estimated to account for 67 percent of current domestic bioethanol production capacity. Quebec is estimated to account for 7 percent of current domestic bioethanol production capacity and the western provinces of Manitoba, Saskatchewan, and Alberta combined are estimated to account for 23 percent of domestic bioethanol production capacity.

Table 4						
Conventional & Advanced Bioethanol Supply and Demand						
in million liters						
	2006	2007	2008	2009	2010 (e)	2011 (f)
Beginning stocks	5	4	6	9	8	3
Production (a)	255	800	1,153	1,348	1,360	1,400
Imports (b)	89	481	615	215	230	240
Exports (c)	80	84	289	171	145	150
Total Supply	349	1,285	1,774	1,572	1,598	1,643
Consumption (d)	265	1,195	1,476	1,393	1,450	1,490
Ending Stocks	4	6	9	8	3	3
Production Capacity (Conventional Fuel) (g)						
No. of Biorefineries (g)	5	10	12	14	15	15
Capacity	1,555	1,579	1,810	1,931	2,044	2,100
Production Capacity (Advanced Fuel)						
No. of Biorefineries	0	0	0	1	1	1
Capacity	0	0	0	4	4	5
Co-Product Production (1,000 metric tons)						
Distiller's Dried Grains with Solubles (DDGS) (h)	220	700	1,020	1,190	1,210	1,240
Feedstock Use (1,000 metric tons) (i)						
Corn	510	1,395	1,815	2,180	2,255	2,455
Wheat	135	645	1,140	1,270	1,220	1,115
Other (e.g. wood, etc.)	-	-	-	5	40	50
Total Feedstocks	645	2,040	2,955	3,455	3,515	3,620

Notes- Sources

(a), (d) [Energy Information Association](#) (Branch of U.S. Department of Energy)(b), (c) [Global Trade Atlas Network](#)

(e) Estimated

(f) Forecast

(g) [Renewable Fuels Association](#)

(h) Conversion Rate-Every ton corn/other feedstock produces 33 percent DDGs, Every ton wheat feedstock produces 37 percent DDGs. Numbers are rounded to convey these figures are derived from formulas, not actual reported statistics.

(i) 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, not actual reported statistics.

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 being 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. Only one multinational corporation, ADM, has involved itself in the production of Canadian bioethanol. ADM has invested in Husky's large, wheat-based bioethanol production facility in Lloydminster, Saskatchewan. To date, multinationals have not expressed interest in Canadian produced bioethanol, seeing Canada primarily as a market for U.S.-produced bioethanol. This may change once the Canadian government's federal mandate takes effect.

Table 5	
Canadian Bioethanol Producer Business Models	
Energy Producers and Marketers:	
	<u>Location / Primary Feedstock / Plant Capacity / Start-up</u>
Suncor Energy	<i>Plant 1:</i> Sarnia, Ontario / Corn / 2,225 million liters / 2006 <i>Plant 2:</i> St-Clair, Ontario / Corn / 2,225 million liters / 2010
Husky Energy	<i>Plant 1:</i> Minnedosa, Manitoba / Wheat, some corn / 130 million liters / 2007 <i>Plant 2:</i> Lloydminster, Saskatchewan / Wheat / 130 million liters / 2006
Grain Based Bioethanol Plants with Producer Equity:	
	<u>Location / Primary Feedstock / Plant Capacity / Start-up</u>
GreenField Bioethanol	<i>Plant 1:</i> Varennes, Quebec / Corn / 132 million liters / 2007 <i>Plant 2:</i> Chatham, Ontario / Corn / 162 million liters / 1996 <i>Plant 3:</i> Tiverton, Ontario / 26 million liters / 1989 <i>Plant 4:</i> Johnstown, Ontario / Corn / 225 million liters / 2008 <i>Plant 5:</i> Hensall, Ontario / Corn / 200 million liters / 2010
Poundmaker	Lannigan, Saskatchewan / Wheat / 12.5million liters / 1991
Terra Grain Fuels	Belle Plaine, Saskatchewan / Wheat / 162 million liters / 2008
IGPC	Aylmer, Ontario / Corn / 150 / 2008
Kawartha Bioethanol	Havelock, Ontario / Corn / 80 million liters / 2010
North West Bio Energy	Unity, Saskatchewan / Wheat / 25 million liters / 2009

Table continued on next pages.

Table 5, continued	
Canadian Bioethanol Producer Business Models	
Renewable Fuels Companies:	
	Location / Primary Feedstock / Plant Capacity / Start-up
NorAmera Bioenergy	Weybur, Saskatchewan / Wheat / 25 million liters / 2005
Iogen	Ottawa, Ontario / Wheat straw / 4 million liters / 2004
Enerkem	Westbury, Quebec / Wood waste / 5 million liters / 2005
GreenField Bioethanol/Enerkham Joint Venture	Edmonton, Alberta / Municipal landfill waste / 36 million liters / 2010

ii. Bioethanol Trade

Due to the North American Free Trade Agreement 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 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.

The possibility of significant volumes of 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 exports to the United States. In addition, the transportation, distribution and infrastructure issues around bioethanol trade have yet to be resolved.

iii. 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 will undoubtedly 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 at this time, is the main feedstock for Canadian bioethanol production. Ontario is the largest corn-producing province in Canada and not surprisingly, where 67 % of the Canadian bioethanol production takes place. In 2010, and 2011, corn is expected to account for 64 percent, and 68 percent of bioethanol feedstock, respectively, as more corn-based bioethanol plants come online.

(b) Bioethanol Produced from Wheat

Wheat is the feedstock for most of the balance of Canada's bioethanol production. In 2009, it accounted for 38 percent of the feedstock, and is forecast to account for 35 and 31 percent, of the grain-based bioethanol feedstock for years 2010, and 2011, respectively. The newer wheat bioethanol plants have more flexibility built-in as the 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 was 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.

There are additional layers of complication when using wheat as a feedstock in bioethanol production, depending on the co-products produced and the markets for which they are destined. The Canadian Wheat Board (CWB) controls the sales of wheat for human consumption and export. As long as the bioethanol is used as fuel and the DDG's use 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, bioethanol plants purchase wheat in the same way a feed mill makes purchases, either directly from farmers or from a grain company. While the CWB promotes industrial uses for its western-grown grains and its mandate allows it to enter the market for sales of wheat for bioethanol production, it currently does not do so.

C. Biodiesel

i. Biodiesel Production

The Canadian government's Notice of Intent anticipates that to reach its objective of a federal mandate of 2 percent renewable fuel content in diesel fuel, 600 million liters of diesel fuels will be required. Despite the Government of Canada's announcement that it intends to mandate renewable fuel content in diesel fuel, the growth in biodiesel production capacity has not increased significantly until recent years. A stronger driver of the increase in biodiesel production capacity seems to be provincial mandates which will be in force ahead of the federal mandate.

Table 6							
Conventional & Advanced Biodiesel Supply and Demand							
in million liters							
	CY	2006	2007	2008	2009	2010 (e)	2011(f)
Production (a)		43	92	135	187	190	195
Imports (b)		340	358	268	363	370	375
Exports (c)		320	355	308	445	445	450
Consumption (d)		65	95	98	105	115	120
Ending Stocks		3	3	0	0	0	0
Production Capacity (Conventional Fuel) (g)							
No. of Biorefineries		3	4	4	7	13	13
Capacity		97	214	322	457	478	485
Production Capacity (Advanced Fuel)							
No. of Biorefineries		0	0	0	0	0	0
Capacity		0	0	0	0	0	0
Feedstock Use (1,000 metric tons) (h)							
Rapeseed Oil		5	5	5	25	35	105
Animal Fats		40	80	110	130	125	65
Mixed		0	0	10	20	20	15
Total Feedstock		45	85	125	175	180	185

Notes- Sources

(a), (d) Energy Information Association

(b), (c) Global Trade Atlas

(e) Estimated

(f) Forecast

(g) [Canadian Renewable Fuels Association](#)

(h) 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, not actual reported statistics.

Biodiesel production is projected to increase slightly in 2010 up to 190 million liters from 187 million in 2009. Additionally, the EU's increased demands for renewable energy has generated a growing market for wood pellets exports within Canada, expanding old plants and creating new production facilities. Even with the current plants and the potential 225 million liter Canada Bioenergy/ADM plant that is currently under consideration, the federal biodiesel mandate is unlikely to be met solely with domestic production. Future growth, of the Canadian biodiesel industry may be limited to the industry's ability to secure cheap feedstock. Most of the current and forecasted increase in biodiesel comes from rendered animal by-products. Industry sources put a ceiling on potential production from rendered animal fats at 250 million liters. Specifically, the large increase in rapeseed oil as a byproduct is a result of record acreage by canola farmers in response to increased demand from canola oil for use as an oil in the food retail industry flooding the market.

High prices for oilseeds may hinder Canada's ability to supply the majority of the feedstock necessary for the balance of the volume required. The federal government's biofuel strategy program is geared more towards bioethanol and are therefore limited in their ability to address the limiting factors for biodiesel market growth. This has implications when trying to determine the profitability for 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. Many diesel investors plan to apply for 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, but it expires in early 2011.

ii. Impacts of Biodiesel Production on Feedstock Markets

(a) Biodiesel Produced from Canola and Animal Fats/Oils

With a 2 percent biodiesel mandate coming into force, the choice of feedstock comes into question. While biodiesel can be made from a variety of different feedstock's, prices and availability are the determining factors of which one will be used. While canola, due to the abundance of the Canadian production, was thought to be the natural choice for feedstock, studies suggest that this may not be the case. Key competitors facing canola oil for use in biodiesel are rendered oils (yellow grease), rendered animal fats (tallow), 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 the international markets. Palm oil and rendered fats are priced at feed and industrial use levels.

Most of the growth in biodiesel production capacity has occurred in Western Canada, spurred on by provincial mandates.

Canola production has reached record high levels in recent years. Increased demand from canola oil from the food retail industry has resulted in higher prices. Canola producers have responded by planting record acreage but rainy conditions during 2010 planting season are a setback to the increasing trend. Despite this supply response, some industry observers suggest that canola could remain too expensive, and that a 2 percent biodiesel blend could only be met with cheaper feedstock. As demand for the feedstock increases, so it is likely that their 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.

Biomass for Heat and Power:

A. Wood Pellets

There is interest in exporting wood pellets from Canada to Europe to meet the increased demand for biofuels in European countries. The European Union (E.U.) has increased funding for renewable energy production, including doubling the financial contribution to renewable energy in 2007 for 2010 targets. The E.U. announced in 2004 that by 2020, 20 percent of its total energy consumption requirements with renewable energy sources, much higher than their current 7 percent rate. The wood pellet industry in Canada, especially in the west, has grown at an annual average rate of more than 20 percent over the last 5 years due to the steady supply of wood residues, and increasing demand from Europe.

The United States and Canada have an estimated 500,000 wood-pellet burning stoves and furnaces with a total annual consumption of 650,000 tons. [BioMass magazine](#), counts nineteen pellet manufacturing plants in Canada with an annual production capacity just over 1 million tons of pellets; most plants located are in the east and west coasts. Contrary to the United States, where almost all the 800,000 tons of wood pellets produced are consumed domestically, more than 80 percent of wood pellets manufactured in Canada are exported to Europe.

Table 7				
Trade: Sawdust and Wood Waste/Scrap				
HS Code 440130				
Canadian Imports				
in metric tons				
Origin	2006	2007	2008	2009
World	259,197	365,845	487,182	649,346
U.S.	259,051	365,290	486,579	647,806
E.U.	146	555	603	1,540
% U.S.	99.35%	99.56%	98.99%	98.75%
% E.U.	0.11%	0.22%	0.49%	0.55%
Canadian Exports				
in metric tons				
Destination	2006	2007	2008	2009
World	1,190,222	1,255,963	1,262,096	1,342,972
U.S.	625,190	647,577	561,673	449,996
E.U.	357,066	376,788	378,628	402,891
% U.S.	68.23%	64.11%	55.31%	45.13%
% E.U.	30.72%	34.78%	41.82%	52.33%
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. Over the past year, there were 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 (Feb 24, 2010). Enerkem continues to grow, currently in the construction phase of its second plant, in partnership with the City of Edmonton and Alberta Innovates.

With support from the Government of Canada, Iogen Corporation has built a demonstration plant to convert biomass fibers to bioethanol using enzyme technology. Located in Ottawa, Ontario, the plant can process over 25 tons of wheat straw per week, using enzymes produced in an adjacent facility. Since the early 1980s, Iogen has received \$30 million in federal funding for its pre-treatment and cellulose enzyme development.

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 that 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.

Additionally, Ontario Power Generation (OPG) is looking to buy two to three million tones of biomass annually by 2015-the date at which the Ontario government has mandated an end to burning coal for electricity generation. Biomass is being targeted to replace coal as soon as technical obstacles are overcome. However, biomass must find a more efficient and condensed solution for transport and handling.

Appendix I

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 date has since been 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 9, the province of Alberta offers a Bioenergy producer credit program (PCP).

Table 8		
Alberta: Provincial Programs to Encourage the Development of a Biofuels Industry		
Program name:	Bioenergy Infrastructure Development Grant Program	Commercialization/Market Development Program
Budget Allocation:	<p>Alberta's Biorefining Commercialization and Market Development Program and Bioenergy Infrastructure Development Program have both been fully allocated and will expire in March 2011. Together, the programs have supported more than 70 bioenergy projects with grants totalling approximately \$150 million.</p> <p>These two programs are no longer accepting applications.</p>	
Administering Ministry or Agency	Alberta Energy	Alberta Energy
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.

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

Table 9		
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.	<u>Bioenergy producer credit program (PCP):</u> The producer credit amount is \$0.09/L for production from plants with a capacity of 150 million liters or more a year. For plants with capacity of less than 150 million liters per year, the credit amount is \$0.14/L. The cap is \$20 million per year and a total of \$75 million for the project. For electricity from biomass (e.g. biogas, syngas), the rate is two cents per kilowatt hour (kWh) for production from capacity of three megawatts (MW) or more and six cents per kWh for production from capacity of less than 3 MW.	<u>Duration:</u> 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 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 by 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 was made public at the end of January 2008.

Renewable Fuel Standard:

Since January 1, 2010, 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, four percent in 2011, and five percent from 2012 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 10		
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; to encourage the development and marketing of wood-to-bioenergy and other bioenergy technologies Began April 1, 2008 and has no specific end date <i>Additional note: The projects funded so far include C\$1.82 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).</i>
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. <i>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: <u>Approved Liquid Biofuels Projects</u>.</i>
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. <i>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: <u>ICE Fund Project Round One</u>.</i>

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 11		
British Columbia: Provincial Mandates, Tax Exemptions, Incentives, and Conditions		
Mandate	Incentives	Conditions/Duration
5 percent for gasoline 5 percent for diesel-phased in over a three year period: 3 percent average starting January 1, 2010; 4 percent (2011) 5 percent (2012)	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.
	<u>Carbon Tax Exemption</u> The exemptions for bioethanol and biodiesel under the Carbon Tax Act, were discontinued, effective January 1, 2010.	<u>Duration:</u> 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 6 percent of bioethanol production capacity.

Table 12		
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	Direct Payment Bioethanol Production Incentive 15 cents/liter producer credit from January 1, 2010 December 31, 2012.	<u>Condition:</u> 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.
2 percent biodiesel pool average in diesel beginning Nov. 1, 2009.	10 cents/liter from January 1, 2013 - December 31, 2015.	<u>Duration:</u> 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.

Context:

According to the most recent data, Ontario boasts approximately 39 percent of Canada's total population, 40 percent of net gasoline sales and 66 percent of bioethanol production capacity.

Table 13		
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.	<p>Bioethanol</p> <p>\$32.5 million for capital assistance to help meet financial challenges;</p> <p>\$60.5 million per year from 2007-2017 for operating assistance to address changing market prices;</p> <p>\$16 million in support of independent retailers selling bioethanol blends;</p> <p>\$7.5 million in private and public funds for research and development opportunities.</p> <p>Biodiesel</p> <p>Biodiesel used in a licensed motor vehicle is exempt from Ontario fuel tax (14.3 cents per liter).</p>	None

(v) Quebec Biofuel Policies

Biofuels Strategy/Policy Documents:

Quebec currently has no mandate in place for renewable fuel content in gasoline. The provincial government is [considering](#) a 5 percent biofuel content mandate in its gasoline pool by 2012.

Production Incentives:

Quebec currently has in place a temporary refundable tax credit (maximum C\$0.185 per liter), 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. 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 to be entitled to the credit is that the 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 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 exceed \$US65 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 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 will soon start 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.

Context: According to the most recent data, Quebec boasts approximately 23 percent of Canada's total population, 20 percent of net gasoline sales and 7 percent of bioethanol production capacity.

Table 14 Quebec: Provincial Mandates, Tax Exemptions, Incentives, and Conditions		
Mandate	Incentives	Conditions/Duration
None, but provincial government is considering a 5 percent bio-fuel content mandate in its gasoline pool by 2012.	<u>Tax Credit Refund</u> 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 US\$65 a barrel or the total cumulative production of bioethanol exceeds 1.2 billion liters <u>Duration:</u> April 1, 2006 - March 18, 2018

(iii) 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 15		
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 <i>Additional note:</i> 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 18 percent of bioethanol production capacity.

Table 16 Saskatchewan: Provincial Mandates, Tax Exemptions, Incentives and Conditions		
Mandate	Incentives	Conditions/Duration
All gas sold must contain 7.5 percent bioethanol, began mid-2006.	<u>Bioethanol Fuel Grant Program</u> Grants for eligible fuel distributors.	<u>Duration:</u> 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 Taskforce](#) 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 fully committed to an official provincial mandate.

Appendix II
Energy Production and Consumption Statistics

Table 17							
Growth in Canadian Oil Production, Consumption and Net Exports*							
in 1,000 barrels per day							
	2003	2004	2005	2006	2007	2008	2009
Total Oil Production¹	3,110	3,135	3,092	3,287	3,422	3,347	3,274
% change	5%	1%	-1%	6%	4%	-2%	-2%
Total growth (2003-2009)							5%
Crude Oil Production²	2,306	2,398	2,369	2,525	2,616	2,593	2,576
% change	6%	4%	-1%	7%	4%	-1%	-1%
Total growth (2003-2009)							10%
Canadian Consumption³	2,207	2,300	2,345	2,297	2,364	2,318	2,157
% change	6%	4%	2%	-2%	3%	-2%	-7%
Total growth (2003-2009)						12%	-2%
Net Exports of Petroleum	903	836	795	990	1,058	1,035	1,040
% change	4%	-7%	-5%	25%	7%	-2%	1%
Total growth (2003-2009)							13%
*expressed in liquid(l) barrels							
Source: Energy Information Agency, U.S Dept. of Energy							
¹ Total oil production includes lease condensate, natural gas liquid, and other liquids, and refinery processing gain (loss). Negative values indicates refinery processing loss							
² Includes lease condensate							
³ Consumption of petroleum products and direct combustion of crude oil							

Table 18						
Domestic Energy Consumption						
in petajoules (a)						
	2005	2006	2007	2008	2009^(a)	08/09
Residential^(b)	1,403	1,347	1,448	1,466	1,480	.09
Commercial	1,493	1,425	1,471	1,499	1,490	-.06
Industrial	4,857	4,967	5,166	5,090	5,110	.03
Transportation	2,519	2,514	2,616	2,624	2,630	.02
Total	10,272	10,253	10,701	10,679	10,710	.02
(a) The unit of energy or work in the meter-kilogram-second system of units.						
(b) includes consumption of imported energy.						
Source: National Energy Board (Canadian Government)						

Table 19							
Energy Use by Transportation Sector in petajoules							
	2001	2002	2003	2004	2005	2006	2007
Total Energy Use	2,277	2,306	2,362	2,465	2,501	2,492	2,595
Freight	898	892	938	1,002	1,028	1,019	1,085
Passenger	1,291	1,323	1,331	1,368	1,376	1,374	1,413
Off road	89	92	93	95	97	100	98
	2001	2002	2003	2004	2005	2006	2007
Shares (%)							
Freight	39%	39%	40%	41%	41%	41%	42%
Passenger	57%	57%	56%	55%	55%	55%	54%
Off road	4%	4%	4%	4%	4%	4%	3%
* year 2007 is the year for which the most recent data is available							
Source: Office of Energy, Natural Resources Canada							

Table 20					
Transportation Sector Energy Use by Source in petajoules					
	2003	2004	2005	2006	2007
Total Energy Use	2,362	2,465	2,501	2,492	2,595
Electricity	3	4	4	4	3
Natural Gas	2	2	2	2	2
Motor Gasoline	1,355	1,384	1,378	1,380	1,438
Diesel Fuel Oil	698	745	782	783	819
Light Fuel Oil and Kerosene	0	0	0	0	0
Heavy Fuel Oil	67	69	68	57	69
Aviation Gasoline	3	3	3	3	3
Aviation Turbo Fuel	223	246	256	253	249
Propane	12	13	10	12	12
	2003	2004	2005	2006	2007
Shares (%)					
Electricity	0.1%	0.2%	0.2%	0.2%	0.1%
Natural Gas	0.1%	0.1%	0.1%	0.1%	0.1%
Motor Gasoline	57.4%	56.1%	55.1%	55.4%	55.4%
Diesel Fuel Oil	29.6%	30.2%	31.3%	31.4%	32%
Light Fuel Oil and Kerosene	0.0%	0.0%	0.0%	0.0%	0.0%
Heavy Fuel Oil	2.8%	2.8%	2.7%	2.3%	2.8%
Aviation Gasoline	0.1%	0.1%	0.1%	0.1%	0.1%
Aviation Turbo Fuel	9.4%	10.0%	10.2%	10.2%	9.6%
Propane	0.5%	0.5%	0.4%	0.5%	0.5%
* year 2007 is the latest year for which data was available					
Source: Office of Energy, Natural Resources Canada					

Appendix III
Biofuel Plants: Existing, Expanding, Under Construction

Table 21 Bioethanol Production Plants: Existing, Expanding, Under Construction				
Status	Location	Company Name	Primary Feedstock	Expected Capacity (million liters)
Existing	Varenes Quebec	GreenField Bioethanol	corn	132
Existing	Westbury, Quebec	Enerkem	wood waste	5
Existing	Chatham, Ontario	GreenField Bioethanol	corn	162
Existing	Ottawa, Ontario	Iogen	wheat straw	4
Existing	Sarnia, Ontario	Suncor Energy	corn	225
Existing	Tiverton, Ontario	GreenField Bioethanol	corn	26
Existing	Johnstown, Ontario	GreenField Bioethanol	corn	225
Existing	Collingwood, Ontario	Collingwood Bioethanol	corn	50
Existing	Aylmer, Ontario	IGPC	corn	162
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	Poundmaker	wheat	12.5
Existing	Belle Plaine, Saskatchewan	Terra Grain Fuels	wheat	150
Existing	Red Deer, Alberta	Permolex	wheat	40
<i>Under construction</i>	St-Clair, Ontario (expansion of current plant)	Suncor	corn	225
<i>Under construction</i>	Havelock, Ontario	Kawartha Bioethanol	corn	80
<i>Under construction</i>	Unity, Saskatchewan	North West Bio Energy	wheat	25
<i>Under construction</i>	Edmonton, Alberta	GreenField Bioethanol/Enerkem Inc.	municipal landfill waste	36
<i>Under construction</i>	Hensall, Ontario	GreenField Bioethanol	corn	200
TOTAL:				2,044.5
Source: Canadian Renewable Fuels Association				

Table 22 Biodiesel Production Plants: Existing, Expanding, Under Construction				
Start-up	Location	Company Name	Feedstock	Capacity (million liters)
2005	Montreal, Quebec	Rothsay	Tallow	35
2008	St-Alexis-des-Monts, Quebec	Bio-Diesel Quebec Inc	Yellow grease	12
1996	Foam Lake, Saskatchewan	Milligan Bio- tech	Canola oil	1
2006	Hamilton, Ontario	BIOX Corporation	Tallow, yellow grease, palm oil	66
2009	Winnipeg, Manitoba	Greenway Biodiesel	Canola	20
2005	Calgary, Alberta	Western Biodiesel Inc	Multiple feedstock	20
2009	Mississauga, Ontario	Methes Energies Canada	Multiple feedstock	6
2010	Beausejour, Manitoba	Eastman Bio- Fuels	Canola	12
2008	Delta, BC	City-Farm Biofuel Ltd.	Recycled oil/tallow	12
2009	Arborg, Manitoba	Bifrost Bio- Blends	Canola	3
2009	Lethbridge, Alberta	Kyoto Fuels	Tallow	66
2011 Under Construction	(West) Lloydminster, Alberta	Canadian Bioenergy	Canola	225
TOTAL:				478
Source: Canadian Renewable Fuels Association				