



Canada: Ethanol Production Equipment

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Summary

Many opportunities exist for U.S. suppliers and manufacturers in Canada's ethanol industry. Canada is among the world leaders in ethanol output. According to the Canadian Renewable Fuels Association, Canada produces 1 billion liters of ethanol and has over 1,000 retail locations that sell ethanol-blended gasoline. Currently almost all ethanol production in Canada and the U.S. is based on renewable agricultural feedstock such as corn and wheat.

As part of a national energy initiative, the Canadian government has set out an aggressive policy to expand the production of cleaner biofuels to address the major concern pertaining to greenhouse gas reductions. With increased demand for cleaner fuels, the ethanol industry is being viewed with renewed interest from government and investors alike. It continues to offer tremendous opportunities for agriculture related industries and services, through preferential policies as well as incentives.

Market Demand

Ethanol, otherwise known as ethyl alcohol is mainly produced from agricultural feedstock such as corn, wheat, barley or sugarcane. It can be either used purely as a transportation fuel or an octane enhancing component of gasoline. Conventional gasoline is a combination of 10% ethanol and gasoline known as gasohol, E10, or RBOB (Reformulated Gasoline Blend stock for Oxygen Blending as listed on the Nymex Commodities exchange). Lately there has been renewed interest in ethanol due to its ability to reduce carbon dioxide emissions through increased ethanol content in gasoline. In some instances, carbon dioxide emissions have shown to be reduced by as much as 20-30% under the proper combustion schemes. The U.S. Clean Energy Act also calls for less carbon monoxide and reduced volatile organic carbons (VOC's) from exhaust systems.

Environmental concerns are a topic of major discussion in Canada, specifically carbon emissions and greenhouse gases (GHGs). In June 2008, the cost of conventional crude oil traded as high as \$143, driving up the global cost of gasoline, and prompting many to question the dependency on petroleum based assets. Ethanol and other biofuels hope to partially resolve this dependency through alternative solutions. While crude oil demand has somewhat weakened (in the face of global credit crunch), the scarcity of conventional oil combined with a recovering economy could easily raise energy costs to exorbitant levels.

Widespread adoption of biofuels has also found a strong movement, most notably in Brazil (which together with the United States comprises 70% of global ethanol output). Mandatory Brazilian law has called for a minimum 25% anhydrous ethanol mixture (also known as E25) to be used in all automotive vehicles, and is considered by many to be the world's first sustainable biofuel economy. Subsequently both the U.S. and Canada have announced major initiatives to bring ethanol production to full-scale production. Several other European countries such as Sweden have also begun phasing in a high ethanol content gasoline, E85, to reduce green house gasses and curb carbon emission.

Outlook for this sector remains extremely high. In July 2007, Prime Minister Steven Harper announced the ecoENERGY for Biofuels Initiative, which has pledge to invest upwards of \$1.5 billion over 9 years to boost Canada's production of renewable resources. It will attempt to provide incentives to producers of renewable resources and make investment in production facilities attractive. The Harper government has also eliminated previous excise tax exemptions. By 2010 it is expected that gasoline contain 5% renewable content, and 2% renewable content for diesel fuel and heating oil. According to the Canadian Renewable Fuels Association,

Canada will require over 2 billion liters of renewable fuels in order to meet this content requirement, thus creating tremendous opportunity for agricultural producers and renewable fuel sectors. Initial incentive rates will be set at \$0.10/L for renewable alternatives and up to \$0.20 for renewable diesels, and adjusted accordingly.

In tandem, the Minister of Agriculture and Agri-foods launched the ecoAGRICULTURE Biofuels Capital Initiative (ecoABC), a \$200 million dollar plan to help provide contribution payments of up to \$25 million per project to align capital funding with biofuel initiatives. Another \$500 million will be made available over 8 years in the form of the Sustainable Development Technology Canada fund (SDTC) to accelerate the commercialization of new renewable technology.

Market Data

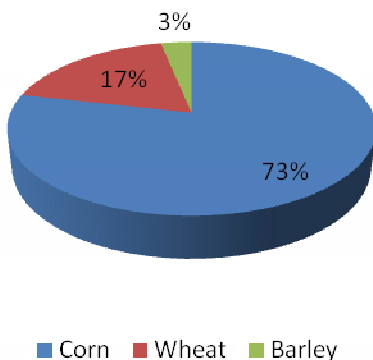
Currently, 4 ethanol plants are expected to come online, adding an additional 341 million liters to the renewable fuels stockpile.

Ethanol Plants Currently Under Construction					
Company	City	Province	Feedstock	Capacity (Liters)	Websites
North West Bio-Energy	Unity	SK	Wheat	25,000,000	www.northwestterminal.com
Greenfield Ethanol	Hensall	ON	Corn	200,000,000	www.greenfieldethanol.com
Kawartha Ethanol	Edmonton	AB	Waste	36,000,000	
	Havelock	ON	Corn	80,000,000	www.kawarthaethanol.ca

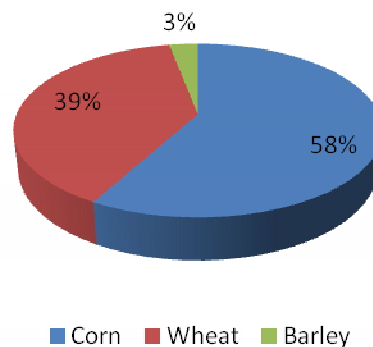
Source: Canadian Renewable Fuels Association

While developments in cellulosic bio ethanol may lead to a switch to corn stover, miscanthus or switchgrass as the future crop of preference, until then, traditional grains and current agricultural products and equipment will remain the primary choice for ethanol production. Ethanol plants as of 2004 sourced 73% from corn, 17% wheat and 3% from barley, respectively. The new Ethanol Expansion Plan will change the current composition by increasing the amount of wheat ethanol produced domestically.

Ethanol Production by Product (2004)



Ethanol Production after EEP (2008)



Quantity of Corn Used for Feed, Ethanol Production; in Thousands of Metric Tons					
Year	Domestic Production	Corn Imported	U.S. Corn Imports	Corn for Fee	Corn for Ethanc
2004	8,837	2,101	2,098	7,440	360
2005	9,361	2,155	2,150	7,830	560
2006	8,990	1,899	1,893	8,275	635
2007	11,649	2,580	2,554	8,900	1,054
2008	9,725	2,800	2,775	8,550	1,615

Note: Import data based on a calendar year, all corn excluding popping corn. No official statistics exist for use of corn, estimates based on production in a calendar year.

Source: USDA Foreign Agricultural Service, GAIN Report – CA8057, Table 7.2, page 28

Quantity of Wheat Used for Feed, Ethanol Production; in Thousands of Metric Tons					
Year	Domestic Production	Wheat Imported	U.S. Wheat Import:	Wheat for Fee	Wheat for Ethanc
2004	25,860	14	14	5,056	150
2005	26,775	18	17	5,056	150
2006	25,265	26	25	4,800	189
2007	20,054	25	23	4,000	455
2008	24,200	25	22	4,000	695

Note: Import data based on a calendar year and includes only HS code 1001. No official statistics exist for use of wheat, estimates based on production in a calendar year.

Source: USDA Foreign Agricultural Service, GAIN Report – CA8057, Table 7.3, page 28

Best Prospects

Key Suppliers

Currently there are 8 companies that produce ethanol products at 12 plants.

Ethanol Plants Currently Producing in Canada					
Company	City	Province	Feedstock	Capacity (Liters)	Websites
Collingwood Ethanol LP	Collingwood	ON	Corn	50,000,000	www.collingwoodethanol.com
Enerkem Inc.	Westbury	PQ	Wood	5,000,000	www.enerkem.com
GreenField Ethanol	Johnstown	ON	Corn	200,000,000	www.greenfieldethanol.com
	Varenes	PQ	Corn	120,000,000	
	Tiverton	ON	Corn	26,000,000	
Husky Energy	Chatham	ON	Corn	150,000,000	
	Lloydminster	SK	Wheat	130,000,000	www.huskyenergy.ca
IGCP Ethanol Inc.	Minnedosa	MB	Corn	130,000,000	
	Aylmer	ON	Corn	150,000,000	www.igpc.ca
Iogen Corporation	Ottawa	ON	Straw	2,000,000	www.iogen.ca
NorAmara BioEnergy Corp.	Weyburn	SK	Wheat	25,000,000	www.noramabioenergy.com
Permolex International, L.P.	Red Deer	AB	Wheat	40,000,000	www.permolex.com

Source: *Canadian Renewable Fuels Association.*

Market Entry

While barriers may prevent direct involvement in ethanol and grain production, there still exists a growing market for machinery and equipment to serve both industries. With federal regulations requiring 5% biofuel in all fuel there have been numerous ethanol projects started or planned. These new plants, and existing plants, will require products and services to help them grow and to help them remain competitive. This growth in ethanol production will require more grains meaning that farmers will require more machinery and products in order to yield the best results from their land.

Demand for Equipment

There remain ample opportunities for businesses looking to invest in Canada's growing ethanol industry without physically producing ethanol or grains. Many of these opportunities allow for equipment manufacturers and other service providers to provide products and services to new and existing ethanol projects, along with opportunities supplying agricultural machinery.

Storage equipment and technology is a vital aspect of ethanol production. Tanks and silos for storing corn and/or cereal grains, ethanol, dried distillers' grain and other products in ethanol production are essential pieces of equipment in ensuring quality ethanol production.

The need for tanks and equipment designed to facilitate fermentation are also the key component to ethanol production. The tank, chemicals, enzymes, yeasts, monitoring equipment, piping, pumps and other equipment necessary for successful fermentation are important for the production of quality ethanol. Equipment providing better efficiency in the conversion of starches to sugars to alcohol will be of valuable use in the ethanol industry. The filtration and distillation portion of ethanol production also has its own unique equipment needs in order to facilitate the most efficient separation of ethanol from water and other components. Without reliable filtration equipment, a large portion of ethanol produced may be lost in the process.

Additional equipment and services for the ethanol industry are also in demand. The need for electronic monitoring equipment for all processes in ethanol production along with piping and other transport material for all stages in production are necessary to ensure smooth transitions from one stage to another. Grain inspection technology and jet cookers are crucial in ensuring there are no bacterial infections compromising the ethanol. Carbon dioxide scrubbers, tank cleaners, dust collectors and other similar technology ensure that the plant follows environmental regulations and stays in pristine shape. Pre-treatment requirements and the added processes in production may also create an added market for equipment designed for cellulosic ethanol production.

Transportation needs for grains, DDGs, and ethanol fuel provides opportunities for trucking companies, trucking service companies, and railway service companies. According to the Canadian Renewable Fuels Association, many ethanol plants are located in rural areas in order to remain close to grain producers. Rural roads may have issues in regards to quality and access and may require trucks to be specially fitted or require the construction and/or renovation of new roadways. This creates an opportunity for trucking service companies and companies that supply products and equipment to road construction. Many ethanol plants also take advantage of rail lines due to the fact that large amounts of grains and fuels are transported via rail enabling a reliable transportation system for both inputs and outputs. This will provide opportunity for companies providing rail services such as rail car production, leasing, service and maintenance.

As growth in ethanol production requires a greater amount of inputs and, therefore, an increase in demand for agricultural equipment as well. There is little to no difference in the type of agricultural equipment used for grains produced for ethanol production; however, those companies currently providing services to the agricultural sector could see the market grow due to demand for greater ethanol production.

List of Equipment, Products and Services Required for Ethanol Production		
Name	Type	Use
Boilers	Equipment	Boils alcohol/water during distillation.
Centrifuges	Equipment	Separates large particles of distillers' grain from water and stillage.
Chemical Products	Product	Used in various stages of production i.e. Distillation and cleaning.
Consultation	Service	Useful for mechanical/electrical/environmental/legal advice for ethanol producers.
Control Systems	Equipment	Controls for all aspects of production.
Direct Steam Injectors	Equipment	Pre-treatment for production of cellulosic ethanol.
Dust Collection Systems	Equipment	Ensuring plant meets environmental/labor standards
Engineering Support	Service	Advice and services regarding plant design/storage/building design/equipment design.
Name	Type	Use
Enzymes	Product	Assists in transforming starch into sugar
Evaporators	Equipment	Evaporates thin stillage to create syrup/recycled mash.

Fermentation Tanks/Pipes/Equipment Filtration Systems	Equipment	Storage/movement of mash/beer while the fermentation process is in progress.
	Equipment	Removal of water from 190-proof ethanol to create 200-proof ethanol.
Fractionation	Equipment	Provides minimal starch loss, maximum germ quality.
Grain Grading	All	Providing quality checks of the grain, mash, flour, beer, stillages, syrups, ethanol and DDGs.
Grain Scalpers/Cleaners	Equipment	Preparation of grains for ethanol production.
	Hammermills	Grinds grain into a fine flour.
Heat Exchangers	Equipment	Ensures efficiency in starch to sugar conversion, helps remove impurities. Used with Jet Cooker.
	Hydro Blasters	Plant Maintenance/Cleaning
Industrial Dryers	Equipment	Production of dried distillers' grain.
	Jet Cookers	Ensures efficiency in starch to sugar conversion, helps remove impurities and diseases. Used with Heat Exchanger.
Level Indicators	Equipment	Monitoring quantity of inputs/product in production/outputs.
Maintenance Services	Service	Providing support for plant operations.
	Material Handling Equipment	Equipment/Products
Pellet Mills	Equipment	Cellulosic ethanol production.
	Pumps	Equipment
Regenerative Thermal Oxidizers	Equipment	Reduction of Greenhouse Gas Emissions
Safety Assistance	Products/Services	Providing assistance/products to ensure plant complies with safety regulations.
	Screw Press	Equipment
Silos and related products	Product	Storage of grains/DDGs.
	System Monitoring	Equipment
Tank Cleaners	All	Ensuring tanks are maintained and cleaned regularly.
Tanks	Product	Storage of ethanol, other products.
	Transportation	All
Wastewater Treatment	All	Ensuring water used in production is treated to comply with regulations.
Yeast	Product	Aids fermentation.

Note: Equipment listed here used for the Dry Milling process for ethanol production. Plants, in addition, may use other equipment/products/services than the ones listed above. Quantity and size of equipment varies by plant.

Conclusions

In summary, the ethanol industry in Canada is both growing and is making headway into more sustainable forms of energy. Because of this growth, there is more opportunity for companies looking to export goods and services,

such as machinery, that aid both ethanol producers and agricultural producers.

Trade Events

GOEXPO 2009, Calgary, Alberta, Canada <http://www.petroleumshow.com/goexpo/>
Agri-Trade 2009, Red Deer, Alberta, Canada <http://www.agri-trade.com/index.asp>

Resources & Contacts

Canadian Renewable Fuels Association	http://greenfuels.org
Natural Resources Canada	http://www.canren.gc.ca
Agriculture & Agri-foods Canada	http://www.agr.gc.ca
Ethanol Renewable Fuel Association	http://www.ethanolrfa.org
Office of Energy Efficiency	http://oee.nrcan.gc.ca/english/
ECO Action Canada	http://www.ecoaction.gc.ca/
Renewable Energy Industry Canada	http://www.ic.gc.ca/eic/site/rei-ier.nsf/eng/h_nz00009.html
Office of Energy Efficiency Canada	http://oee.nrcan.gc.ca/english/index.cfm?attr=0
Transport Canada	http://www.tc.gc.ca/
Canola Council of Canada	http://www.canola-council.org/

For More Information

The U.S. Commercial Service in Calgary, Canada can be contacted via e-mail at: crystal.roberts@mail.doc.gov;
Phone: (403) 265-2116; Fax: (403) 266-4743; or visit our website: www.buyusa.gov/canada

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Comments and Suggestions: We welcome your comments and suggestions regarding this market research. You can e-mail us your comments/suggestions to: Customer.Care@mail.doc.gov. Please include the name of the applicable market research in your e-mail. We greatly appreciate your feedback.

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