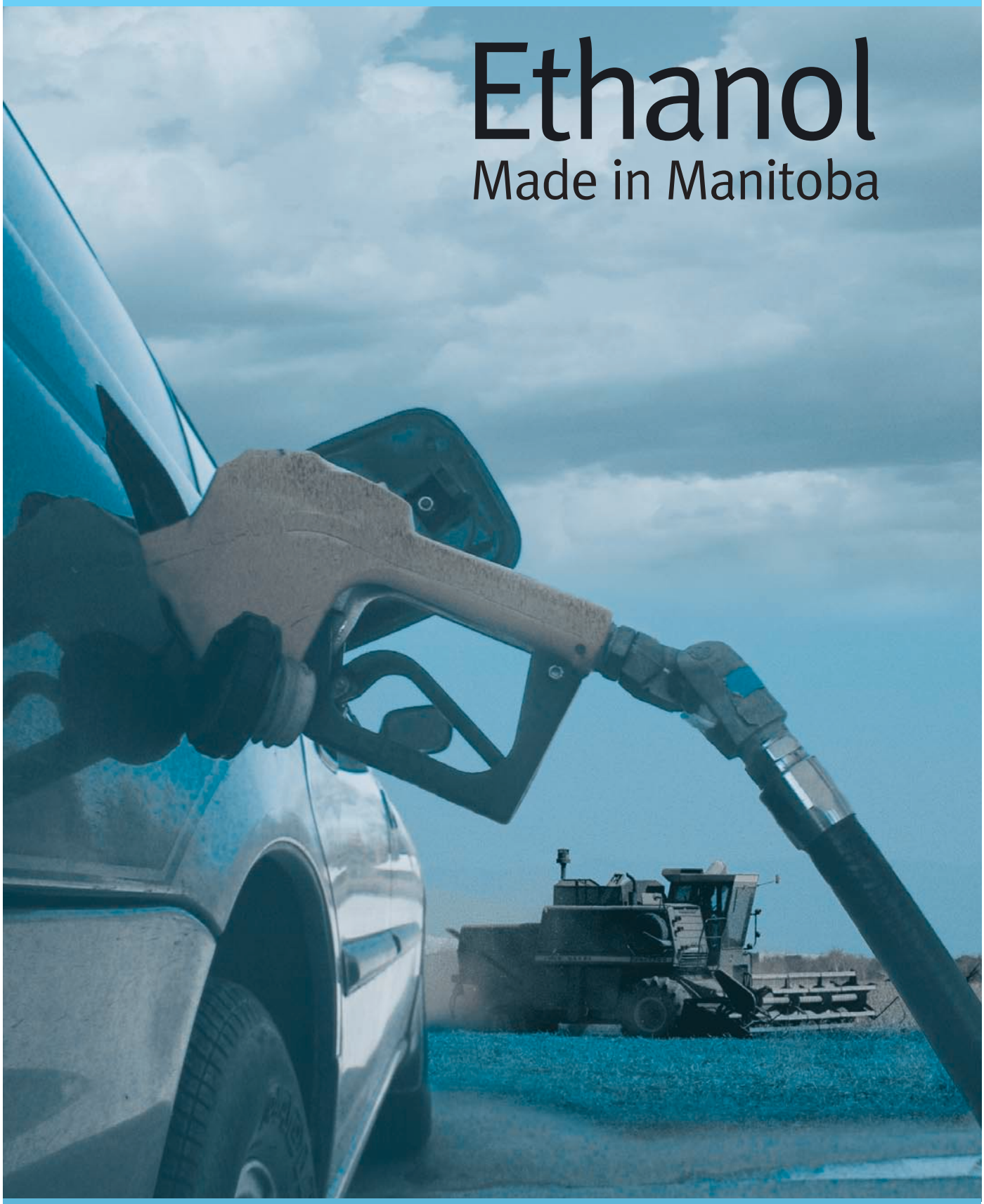
A Report by the Ethanol Advisory Panel
to the Government of Manitoba

Ethanol
Made in Manitoba



MANITOBA ENERGY DEVELOPMENT INITIATIVE

Manitoba
Building for the Future

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Letter from the Panel

Garth Manness

Teri Nicholson

Costas Nicolaou

December 11, 2002

Honourable Rosann Wowchuk
Minister of Agriculture
Legislative Building
Winnipeg, Manitoba

Dear Minister Wowchuk:

We would like to thank the Manitoba government for the opportunity to serve as members of the Manitoba Ethanol Advisory Panel. Throughout our work, which involved both public consultations and private meetings with stakeholders, we were struck by the significant interest in, and potential to, develop the ethanol industry in Manitoba.

This report recommends various strategies to encourage the development of the ethanol industry in Manitoba with specific emphasis on promoting local ownership. It is this type of "Made in Manitoba" strategy that will maximize the benefits of increased ethanol production for all Manitobans.

This report also identifies a number of challenges to expanding this industry and recommends various ways to meet those challenges.

In conclusion, we would like to thank the various Manitoba Government staff who have provided assistance to the panel during our deliberations. These individuals are listed on the back cover.

Garth Manness, Chair

Teri Nicholson

Costas Nicolaou

Executive Summary

Ethanol is a high-octane, water-free alcohol that is usually produced from renewable resources such as corn, wheat, straw and other bio-mass. In Manitoba, as well as in most other jurisdictions, ethanol is blended with gasoline - usually as a 10 per-cent mix - to create gasohol. Ethanol-blended fuels, such as gasohol, act as a natural antifreeze, and due to their higher oxygen content, burn more efficiently in combustion engines.

The Manitoba economy loses approximately $430 million annually in income transfers from gasoline produced in other jurisdictions. The use of 10 per-cent ethanol-blended gasoline, made in Manitoba from Manitoba-grown products, is expected to reduce this annual financial drain on the province by up to $43 million per year. This, combined with an annual savings of $14 million in federal excise taxes, results in a combined impact of $57 million per year on the provincial economy.

A number of value-added co-products, in addition to ethanol, are produced as a result of the distillation process. Typically, these include distillers' dry or wet grains and carbon dioxide.

On July 2, 2002, the Province of Manitoba announced the creation of the Manitoba Ethanol Advisory Panel. The panel was charged with undertaking public and industry consultations and producing a report containing recommendations for a "Made-in-Manitoba" approach that would balance social, environmental, financial and economic development considerations associated with introducing a mandate for ethanol-blended fuels consumed in Manitoba. The panel was comprised of the following members:

1. Mr. Garth Manness - Mr. Manness, who served as panel chair, is the Chief Executive Officer of Credit Union Central of Manitoba.
2. Ms. Teri Nicholson - Ms. Nicholson is an economic development officer and a grain farmer in the Shoal Lake area.
3. Professor Costas Nicolaou - Professor Nicolaou teaches economics at the University of Manitoba and is known for his research in energy issues.

The panel held public consultations in each region of the province and met with many private stakeholder groups. Additional information-gathering activities were also undertaken. In summary, the panel recommends that:

1) the Manitoba government support the development of an ethanol industry in Manitoba by using various policy tools including mandating the use of ethanol;

2) the Manitoba government support the use of feed-grains (primarily wheat) as a feedstock for ethanol production, as well as continue to work with developers of fibre-based ethanol production to advance both types of feedstocks for use in the development of the industry;

3) the Manitoba government support research on high-yielding feed-wheat varieties that will give Manitoba grain producers the ability to profitably grow the amount of grain feedstocks necessary to support the ethanol industry in Manitoba, without risking the feed supply for the Manitoba livestock industry;

4) the Manitoba government set up a one-stop-shop Ethanol Office, which will lead a communication strategy on the development of an ethanol industry aimed at the following: a) sharing all publicly available information that the government has on the industry; b) speaking to interested Manitobans about the economics of the ethanol industry; c) promoting the use and value of the co-products created from the ethanol production process; d) providing public education on the net environmental benefits of ethanol use; e) sharing information with interested community groups on the different ownership models that can be used, and the government support programs available, to assist in the development of a facility;

5) the Manitoba government proactively work with Manitoba producers and investors to develop an ethanol industry in the province that is largely owned and operated by Manitobans;

6) the Manitoba government document and promote the "Manitoba Advantage", which positions the province as the best location to produce and export ethanol to under-supplied markets in North America;

7) the federal and provincial governments collectively offer an incentive that is competitive with neighbouring jurisdictions. We recommend that the Manitoba government lobby the federal government to increase its incentive to a level comparable to the incentive offered by the U.S. government, so as to create a level playing field for the Canadian industry;

8) the province announce that by September 1, 2005, 85 per-cent of the gasoline in the province will be blended with 10 per-cent ethanol. As an intermediate step, we recommend that distributors be required to blend ethanol with gasoline—resulting in 5.0 per-cent of the total volume sold in the province being ethanol—in the period between January 1, 2005 and August 31, 2005; and

9) the government of Manitoba enter into dialogue with industry and other stakeholders once the 85 per-cent requirement has been achieved, to determine whether or not moving to 100 per-cent market penetration would be in the best interest of the province and other stakeholders.

Guiding Principles

The panel operated under the following general principles, proposed by the government as guidelines under which the development of the Manitoba ethanol industry should take place:

- Manitobans will be consulted on how the government should help develop the industry;
- information regarding ethanol will be provided to interested parties in an open and transparent manner;
- potential negative effects on the provincial treasury will be minimized;
- the ethanol industry will be developed in an environmentally sustainable manner;
- economic benefits to Manitoba will be maximized;
- benefits to Manitoba consumers will be maximized;
- development strategies, including the potential use of incentives, will respect existing trade agreements; and
- development strategies will be sufficiently flexible to accommodate facilities of various sizes, as well as competitive or co-operative business models, while promoting maximum benefits to Manitobans.

What We Heard

Throughout the consultation process, the panel heard from a number of Manitobans on the issue of developing the ethanol industry in Manitoba. Comments included:

Ethanol fermentation tank

Dried distillers grain ready to be transported to livestock producers

Anything that provides an additional market for our grain producers is a good thing.
- Canadian Wheat Board

It's about time the government promotes ethanol use in Manitoba—this technology is certainly not new.
- Swan River area grain producer

"The expansion of the ethanol industry has the potential to utilize agricultural commodity based on feedstocks on the prairies that will improve the agricultural industry's economic viability."
- Ducks Unlimited

Although the government's initiative is a step in the right direction, it does not go far enough. We should also be looking at bio-diesel and ethanol-blended diesel.
- Brandon area grain producer

"The Manitoba beef cattle industry has the potential to significantly increase the number of cattle that are fed to finish along with the value-added component of our industry."
- Manitoba Cattle Producers

Government must see to it that plant emissions do not cause more harm than those environmental benefits gained from the use of ethanol.
- Winnipeg resident

"Manitoba is a net importer of feed grains. Expanding ethanol processing will increase imports of corn or shipments of feed wheats from Saskatchewan."
- Daryl Kraft and James Rude, University of Manitoba

Developing the ethanol industry in Manitoba will be important in keeping young people in rural communities... without it, our rural areas are in trouble.
- Arborg area farmer

"If Manitoba has any hope of securing the full benefits of an ethanol industry, it must stimulate demand by mandating the consumption of ethanol as soon as practicable."
- Manitoba Chambers of Commerce

What We Learned

Manitoba Agriculture and Food tour an ethanol facility

Throughout our examination of this issue, the panel was exposed to a wide variety of information, expert opinion and widely held beliefs. These can be summarized as follows:

1. Manitobans support the development of the ethanol industry in Manitoba.
2. Manitobans recognize the need for a mandate in order to develop this industry.
3. Local communities and agricultural producers would like opportunities to own plants, or partner with industry, to expand ethanol production in the province.
4. Rural Manitobans are eager to identify new opportunities for development as a means of providing jobs for young people in rural communities.
5. Manitoba exports approximately 270,000 to 300,000 cattle annually for finishing.
6. Manitoba imports approximately 200,000 tonnes of high-protein feed annually.
7. Manitobans are sensitive to the amount of subsidy government should provide to this industry.
8. There were various views as to the role government should play in determining the appropriate sizes of ethanol plants to be developed.
9. An important driver of economic development for this industry is the use of locally grown feedstocks.
10. Processes must be identified by which to grow lower-grade, high-yielding wheats suitable for ethanol production.
11. Maximizing local input and/or ownership will result in the greatest benefit for Manitoba.
12. Regulatory barriers appear to exist that make the creation of new-generation co-operatives difficult.

13. There is a concern that an expanded ethanol industry will result in increases in the amount of grain currently imported into Manitoba to meet livestock feed requirements.

14. Although there was an initial belief that maximizing economic benefits under local ownership models was only associated with small plants, the panel saw first-hand that large plants could also accomplish this goal.

15. Manitoba and Saskatchewan have been identified as the lowest-cost producers of grain-based ethanol in North America.

16. Although many Manitobans are familiar with ethanol, a large amount of misinformation still exists about the benefits of ethanol production and use.

17. Rural communities need more information on how to develop this industry locally.

18. The ethanol demand in the U.S. is likely to grow from 8 billion litres today to over 16 billion litres by 2010. Several plants are currently under construction in the U.S., with many more being contemplated.

19. Wheat distillers' grain has a higher protein level than corn distillers' grain (approximately 35 per-cent for wheat as opposed to 27 per-cent for corn).

20. Minimizing the impact of fusarium head blight is critical to developing the distillers' grains (DG) market.

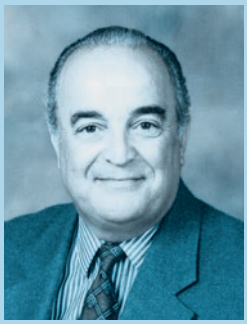
21. The Canadian government has established a target of 35 per-cent ethanol penetration into the gasoline market by 2010, as part of its strategy to reduce greenhouse gas emissions.

22. Ethanol can be used as a gasoline extender or replacer but is more valuable as an octane enhancer and oxygenate.

23. There are a considerable number of environmental benefits to using ethanol-blended fuels, in addition to reduced greenhouse gas emissions. However, there are also some environmental concerns, which must be dealt with during any planned expansion of the industry.

24. Every ethanol project will need a local champion to spearhead the planning, construction and initial start-up of the plant.

25. Many Manitoba farmers have indicated a willingness to supply sufficient feedstocks to sustain a substantial ethanol industry in the province.



"It is high time we moved away from fossil fuels. Ethanol is a relatively small, but nonetheless very important, move in this direction. Moreover, it appears that ethanol production for Manitoba would give our province a developmental boost that would be most welcome. There is very little in the way of difficulties, barriers or other negatives, that cannot be overcome by a systematic strategy of ethanol development. Full steam ahead for ethanol!"

Costas Nicolaou – Panel Member

Manitoba Advantages

Manitoba has a number of natural advantages for ethanol production including feedstock yields that are reliable and consistent, market availability for locally produced co-products and the protein advantage of wheat over corn. During the public consultations, stakeholders identified a number of additional advantages that make Manitoba a premier location for developing an ethanol industry.

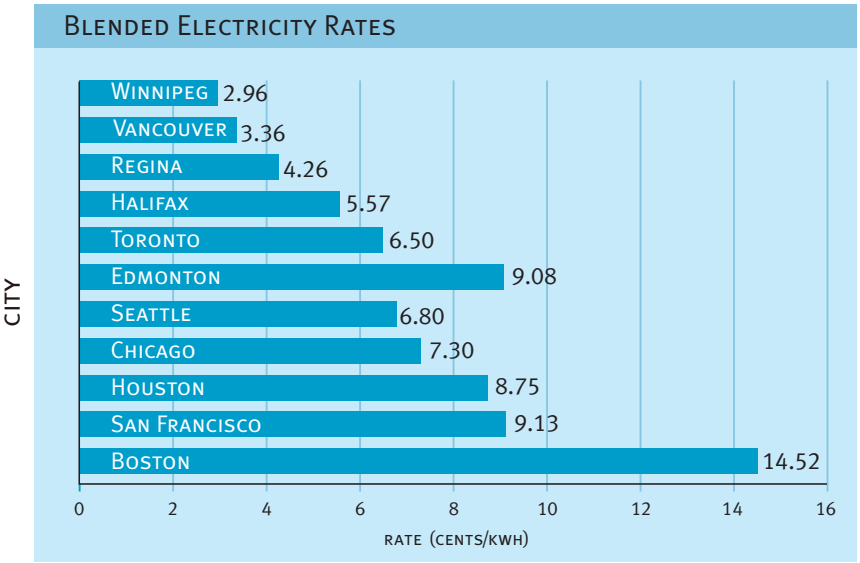
From a business cost perspective, Manitoba offers:

- low land costs;
- affordable labour costs;
- the lowest published electricity rates in North America;
- a strong rural, agrarian economy that can provide the feedstocks needed to satisfy domestic and export markets;
- a natural market for ethanol co-products, such as distillers' grain;
- a prime location for supplying export markets in Ontario and the U.S.; and
- a 10 per-cent manufacturing investment tax credit.

Given these advantages, the panel recommends:

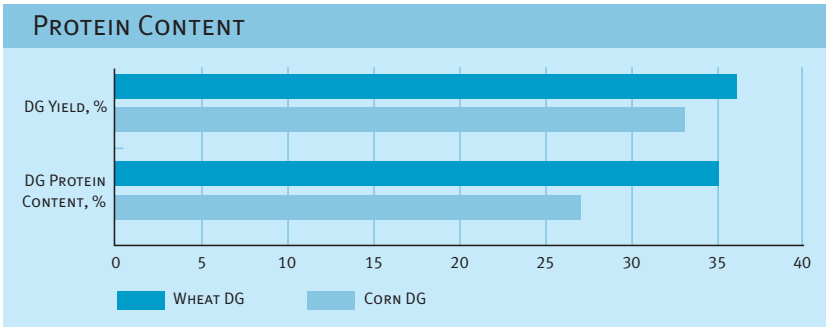
- ***that the province extend the 10 per-cent manufacturing investment tax credit for a long enough period to accommodate the construction of the ethanol plants needed to fulfill a mandate in Manitoba; and***
- ***that the overall Manitoba advantages (including the wheat-to-ethanol advantage) be documented and promoted throughout North America to encourage an export industry.***

Manitoba's electricity rates are the lowest in North America. Following is a comparison of Manitoba's electricity rates with those of other North American jurisdictions:



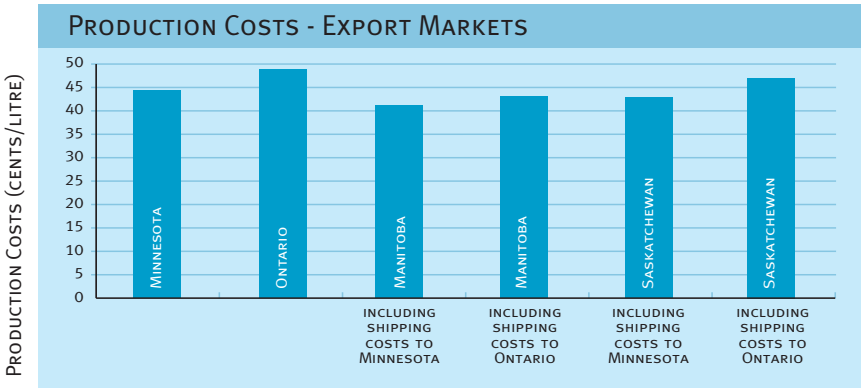
* 30,600,000 kwh/year - 85% load factor Source: Hydro Quebec 2001

Wheat DGs have a higher protein content than corn DGs. The market price for high-protein livestock feed is based on protein levels. Following is a comparison of protein content of wheat vs. corn:



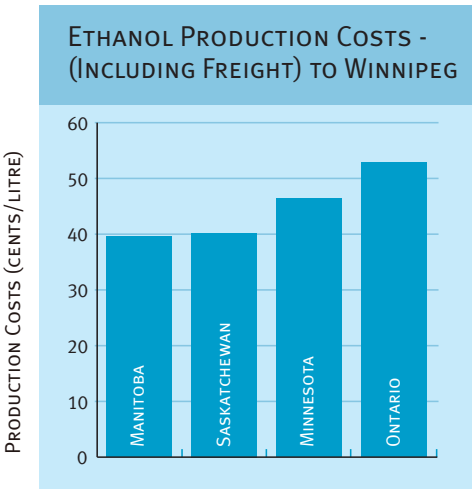
Source: S&T Consultants

Manitoba has a distinct advantage in exporting locally made ethanol into other jurisdictions due to our estimated low production costs and proximity to markets. This is illustrated below:

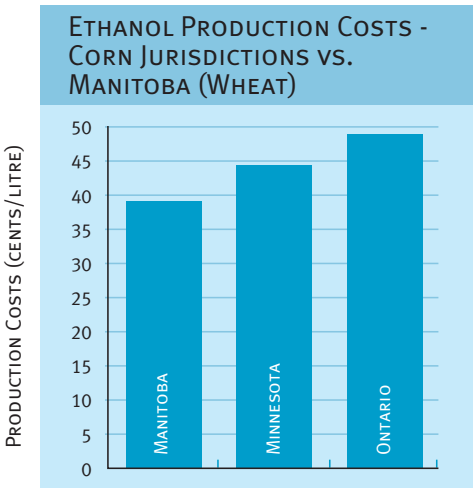


Source: S&T Consultants

Concerns have been raised that heavily subsidized U.S. corn will be brought into Manitoba as feedstock to produce ethanol. On the surface, this seems to be a legitimate issue. However, the economic feasibility of ethanol facilities is determined not only by feedstock costs, but also by the value of co-products.



Source: S&T Consultants



Source: S&T Consultants

There is a cost advantage to producing ethanol from wheat vs. producing ethanol from corn. The Manitoba advantage shown above is due largely to the higher value achieved from the DGs produced from wheat.

Challenges

A number of challenges have been identified that will need to be addressed to move this industry forward and maintain its sustainability over the long term.

These challenges include:

- *the need for more public information on the costs and benefits of developing an ethanol industry in Manitoba* - Manitobans must be informed of the economic and environmental impacts of ethanol use, including its impact on the livestock industry.
- *the need to develop local and export markets for ethanol and co-products* - Research indicates that for the ethanol industry to be sustainable, a strong export market must be identified.
- *insufficient access to investment capital* - This issue could be of particular concern to farmer-owned operations.
- *the need for petroleum industry buy-in* - Ethanol production must be economical for industry to support its development.
- *lack of technical knowledge* - Research and development is required to develop and market more, and higher value-added co-products, and to ensure a long-term supply of feedstocks, including bio-mass.
- *lack of local industry expertise* - Individuals with the knowledge to design the processes required, and to operate a facility, must be identified; currently, in many cases, this expertise must be imported.
- *access to information* - The public and industry are concerned that they don't know where to get the information on ethanol they require. They have also indicated a frustration with multiple sources of information, some of which is conflicting.
- *ensuring feedstock supply* - A sufficient supply of feedstock must be ensured for both the livestock and ethanol industries.
- *fusarium head blight* - This crop disease has been identified as a major problem in Manitoba when using wheat or distillers' grains as livestock feed. A way must be found to deal with the infestation of fusarium in Manitoba wheat.
- *insufficient federal incentives* - Low federal incentives are a barrier to inter-provincial trade, as well as to international competitiveness.

The Environment

The panel was informed that significant environmental benefits can be realized from the increased use of ethanol in gasoline. Although the panel members are not experts in the field of environmental science, all the evidence presented seems to indicate that a 10 per-cent ethanol blend will reduce toxic emissions in automotive vehicle exhaust, as well as reduce overall life-cycle net greenhouse gas (GHG) releases. It has been reported by the Manitoba government (Kyoto and Beyond, Meeting and Exceeding Our Kyoto Targets, June 2002) that over 135,000 tonnes of GHG emissions could be eliminated annually if 10 per-cent ethanol were blended into gasoline sold in the province.

The following table outlines the full-cycle of greenhouse gas emissions and the overall reduction achieved with the use of ethanol-blended fuel.

The results are:

	Canada Gasoline August 2002 Data	10% Ethanol Use
Units	**Grams CO_2 equivalent/mile**	**Grams CO_2 equivalent/mile**
Vehicle Operation	339.0	336.8
Fuel Dispensing	0.5	0.5
Fuel Storage and Distribution	6.7	6.7
Fuel Production	66.7	75.6
Feedstock Transport	1.0	1.5
Feedstock and Fertilizer Production	44.1	46.3
Land Use Changes	0.0	3.8
Leaks and Flares	14.2	13.1
Emissions Displaced by Co-products	0.0	-9.4
Carbon in Fuel from CO_2 in Air	0.0	-24.0
Sub-Total	472.3	451.0
Vehicle Assembly and Transport	8.7	8.7
Materials in Vehicles	43.6	43.4
Total	**524.5**	**503.1**
% Change		**-4.1**

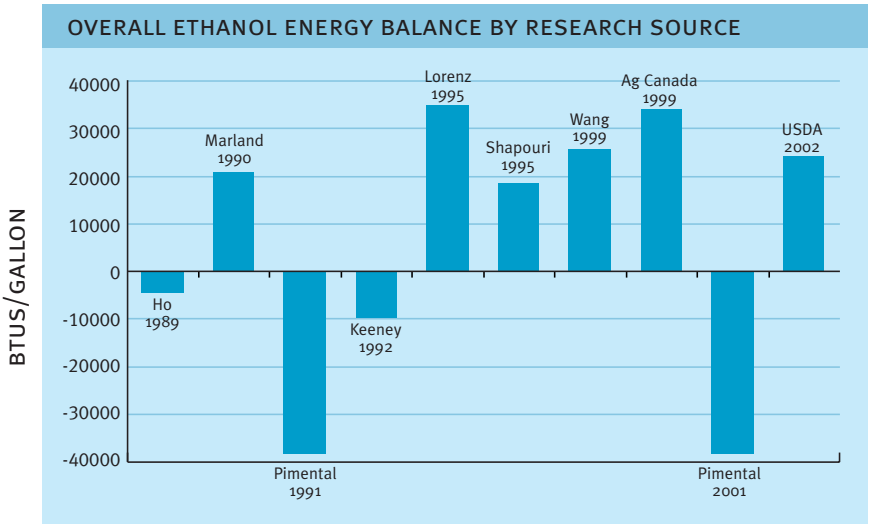
Source: S&T Consultants

The table includes all input from the time the feedstock is planted, through harvest and processing, to the time it is burned in a combustion engine. The result is a net decrease in carbon dioxide equivalent emissions of 4.1 per-cent for 10 per-cent ethanol-blended gasoline.

Energy Balance

A number of studies have been conducted in the U.S. and Canada that have examined the energy balance associated with ethanol production. Only one researcher has shown a significant negative energy balance. The majority of current information indicates a positive energy balance and a trend to improving energy balances. In fact, the most recent study released in 2002 found that corn-based ethanol production results in 34 per-cent more energy produced than is consumed inclusive of all energy used—from seed in the ground to ethanol in the vehicle tank. *(U.S. Department of Agriculture)*.

The following table illustrates both the energy balance results from some studies that have been completed, as well as the trend to more positive results in all but one of the most recent studies:



Source: S&T Consultants

Information provided to the panel, on the most recent review of the use of 10 per-cent ethanol-blended fuels, indicates that carbon monoxide emissions from the vehicle tailpipe are likely to decrease in the 5-25 per-cent range (*Manitoba Conservation*).

The United States Environmental Protection Agency's complex model compares results for base-line gasoline and gasoline blended with 10 per-cent ethanol. The results are:

	Base-line Gasoline	Gasoline with 10% Ethanol	% Change
Units	**Mg/mile**	**Mg/mile**	
Exhaust Benzene	53.54	44.6	-16.63
Non-Exhaust Benzene	5.51	5.51	0
Acetaldehyde	4.44	11.16	151.53
Formaldehyde	9.70	9.70	0
Butadiene	9.38	8.33	-11.2
POM	3.04	3.00	-1.34
Total Exhaust Toxics	**80.10**	**76.83**	**-4.08**

Source: United States Environmental Protection Agency

As indicated in the previous table, overall emissions are reduced with the exception of acetaldehyde. It should be noted, however, that even with the significant increase of acetaldehyde, overall levels remain three to five times below acceptable tolerance levels (*California Environmental Protection Association*).

Another environmental concern associated with the consumption of transportation fuel is that of particulate matter. Particulate emissions are receiving much more attention now that their role in respiratory ailments is better understood. Recent determinations of particulate emissions from vehicles using non-oxygenated gasolines, and gasolines containing 10 per-cent ethanol, were reported in 1999. The results for Tier 0 (vehicles classified as producing higher levels of particulates) and for Tier 1 (vehicles classified as producing lower levels of particulates) indicate significant reductions in overall particulate levels with the use of ethanol-blended gasoline.

	Gasoline	10% Ethanol Blend	% Change
Tier 0 Vehicles	10.3 mg/mile	7.0 mg/mile	-32.2
Tier 1 Vehicles	4.5 mg/mile	3.4mg/mile	-25.3

Source: S&T Consultants

During the public consultations, questions were raised about the environmental impact of the ethanol production process, fuelled largely by reports in the U.S. that emissions from existing plants were exceeding U.S. EPA recommended levels. The panel was informed that new emission control technologies, which dramatically reduce plant emissions, are currently being fitted in new and existing U.S. facilities.

New U.S. ethanol facility

The public consultation process demonstrated to the panel that many Manitobans need more information about the environmental benefits of increased ethanol use.

Therefore, the panel recommends:

- ***that environmental pollution control technologies, that provide the best available controls, be required in the construction of each new plant in Manitoba;***
- ***that the government emphasize, as part of its larger public education campaign, the net environmental benefits of increased ethanol use; and***
- ***that in light of the Canadian government's recently announced commitment to ratify the Kyoto Protocol, the provincial government urge the federal government to institute a national ethanol mandate.***

Consumer Impacts

"Is ethanol-blended gasoline more costly than petroleum gasoline? No! Ethanol-blended gasoline is generally available to marketers at a lower-cost than petroleum gasoline of the same octane. After the (incentives) are applied, the cost of ethanol to marketers is about the same as regular, unleaded gasoline, and often less."
State of Minnesota

"Vehicles may benefit from the extra oxygen carried by oxygenated fuel and the reduction in fuel efficiency may be improved, or even reversed, by more efficient combustion for these vehicles."
Legislative Auditor - State of Minnesota

Potential impacts on the consumer of using a 10 per-cent ethanol-blended gasoline can generally be divided into two categories—potential costs (positive or negative) and drivability issues.

A few Manitobans expressed to the panel a concern that mandating ethanol would increase the price at the pump. Ethanol is relatively inexpensive to blenders and can increase the octane value of gasoline considerably. Later on in this report, the panel will discuss and recommend incentives designed to allow producers to sell to distributors at, or below, the rack-price of gasoline. As a result, there should be no impact at the pump. In fact, during 2000, the price of ethanol-blended gasoline at Nebraska's terminals averaged 1.1 cents (U.S.) lower per gallon than unleaded gasoline. *(Nebraska Ethanol Board)*.

A second potential cost concern related to 10 per-cent ethanol-blended gasoline pertains to the reduction in total energy content of the fuels (ethanol, on a volumetric basis, contains less energy than gasoline). A 10 per-cent ethanol blend contains about 3.5 per-cent less energy than pure gasoline. However, because of the oxygen contained in the fuel, E-10 burns with a higher efficiency. The change in overall consumption, from various controlled tests, ranges from 2.0 to 2.5 per-cent *(S&T Consultants)*. However, there is evidence that the impact is less in real-world driving conditions, where it is difficult to control the operating conditions to the same extent as in a controlled test. What impact there may be is often not noticed by consumers, because it is less than the variation between gasoline produced at different refineries and less than the typical, seasonal variation of gasoline produced at any one refinery. *(Minnesota Department of Agriculture)*.

Drivability concerns relate to how an engine operates on a 10 per-cent ethanol blend of fuel. The potential issues can vary from concerns over engine warranties to whether a person's vehicle will start in the winter. Following are some well-established facts about the drivability of 10 per-cent ethanol blends:

- Ethanol is a high-octane fuel that will operate in all spark ignition engines.
- Ten per-cent ethanol-blended gasoline is warrantied by all car manufacturers selling vehicles in North America. Its use will not void warranties on vehicles.
- Ethanol is an efficient solvent. It cleans out impurities in the fuel tank and fuel line, and deposits these impurities in the fuel filter. It is recommended that fuel filters be replaced after the first full tank of ethanol-blended fuel is used. Thereafter, regular fuel filter replacement schedules should be followed.
- Ethanol-blended gasoline can be mixed with non-ethanol blended gasoline. Car owners needn't worry when travelling to areas where ethanol-blended fuels are unavailable.
- When blended into gasoline at 10 per-cent levels, ethanol provides a natural form of gas line anti-freeze — a valuable asset in Manitoba's winters.
- Although ethanol has a lower energy content per litre than gasoline, it does not appear to reduce mileage when used in 10 per-cent blends. This may be due to its additional oxygen content providing a more efficient combustion process, which results in less production of carbon monoxide emissions at the tailpipe (Canadian Renewable Fuels Association).

Feedstock

Ethanol can be made from sources of starch such as wheat, corn and barley or, alternatively, from agricultural or wood fibre. Viable systems for fibre-based ethanol production are currently under development. Though the focus of this report is on grain-based systems, aspects of fibre systems are referenced to introduce their potential application in Manitoba.

GRAIN SUPPLY

In Manitoba, wheat is the crop with the most near-term potential for conversion to ethanol. Currently, Manitoba exports a significant amount of its wheat as a raw commodity. By using wheat for ethanol production within Manitoba, we can add value to the grain and market it in the form of ethanol and other high-value co-products. Wheat-based ethanol production requires grain with relatively high starch content and correspondingly lower protein concentration. This is found in types of wheat used for feed. Although barley commands most of the livestock feed market, when wheat is used as feed, it draws from the same supply being targeted by the ethanol industry. The issue of additional demand on feed grain supply for livestock, resulting from an expanded ethanol industry, was raised during the consultation process. Consequently, a considerable amount of time was spent studying this aspect from the points of view of the grain producer, the livestock producer and the ethanol producer.

Production of 140 million litres of ethanol would require approximately 420,000 tonnes of wheat, or 7 to 13 per-cent of average, annual Manitoba production, assuming wheat was the sole feedstock. Manitoba produces a much smaller amount of corn, which is also suitable for ethanol production.

Range of Wheat and Corn Production 1990-99 — (million tonnes)

	Production
Wheat	3.2 - 5.9
Grain Corn	0.036 - 0.264

Source: MAF, Statistics Canada, AAFC

Today, 80 to 90 per-cent of Manitoba wheat production is comprised of higher-value milling wheat of the hard red spring wheat class. This class of wheat has been specifically tailored to the quality and high protein demands of the milling industry. Manitoba's hard red spring wheat contains 14 to 15 per-cent protein on average, regardless of grade — generally considered excessive and too high-priced for feed or ethanol.

Higher starch, lower protein classes, such as Canada Prairie Spring (CPS) and hard red winter wheat, together typically account for about 6 to 8 per-cent of Manitoba's production. This low percentage, dedicated to feed varieties, means the supply of feed wheat in Manitoba is largely a function of weather at harvest. Rain during harvest reduces the quality of milling wheat so that it becomes affordable to feed markets. Of course, this supply is also highly variable. Typically, 60 to 80 per-cent of the wheat crop makes the top two grades suitable for milling. The remainder is comprised of non-milling classes and downgraded milling wheat that, in some years, can be as high as 50 per-cent of the crop.

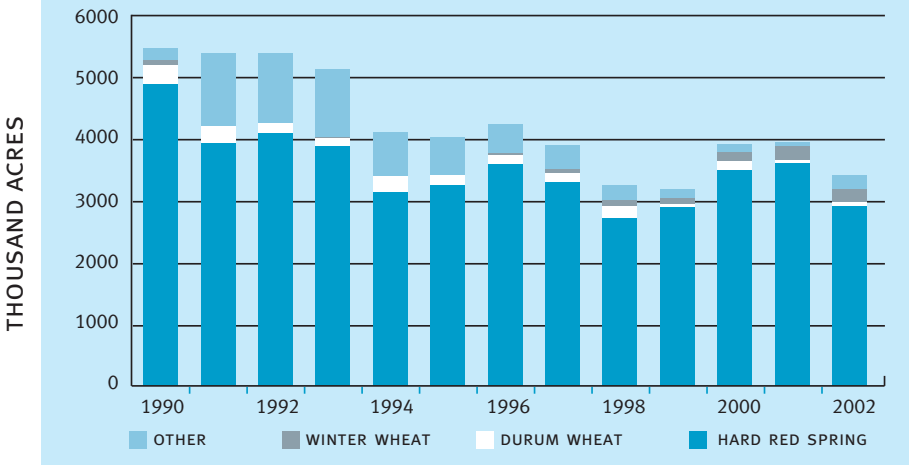
Over the last decade, the total amount of wheat suitable for feed or ethanol annually has ranged from less than 1.0 million tonnes to approximately 2.4 million tonnes. However, this includes down-graded milling wheat, designated as #3 CW, that is sold for feed, only if the feed wheat price matches or exceeds what the milling market is paying. Since the demise of the Crow Rate subsidy, feed wheat prices have been lower than #3 CW milling wheat about two-thirds of the time *(Daryl Kraft and James Rude, University of Manitoba)*. With an estimated 270,000 to 360,000 tonnes of wheat actually consumed as feed in the province, the remaining 1.0 to 2.0 million tonnes that would be suitable for ethanol feedstock, is exported as milling or feed wheat depending on price.

Wet distillers' grain being loaded

Although it may appear that Manitoba produces more than enough wheat to supply ethanol production, the traditional focus on milling wheat and flat barley production relative to demand, has made the province a net importer of feed grain. Barley and wheat come from Saskatchewan while corn is imported from the U.S. It has been suggested that increased demand for feed wheat will increase Manitoba's imports of feed grain *(Daryl Kraft and James Rude, University of Manitoba)*. In fact, it has been estimated that the entire prairie region will become a net importer of feed grain as Saskatchewan moves to higher livestock and ethanol production. While this would be true under the current weather-driven supply scenario, this conclusion does not consider grain producers' ability to break with tradition and plant varieties of wheat specifically tailored for feed or ethanol.

Throughout the consultations, the panel heard that farmers are eager to plant varieties of high-yielding wheat, as soon as they are convinced that their net returns from these varieties would be equal to, or greater than, what they currently receive from growing milling wheat or other crops. It must be noted that this increased acreage of high-yielding wheat would not necessarily replace acreage dedicated to milling wheat but, in some cases, would replace acres destined for other grain, oilseed, or special crops. Oilseed and special crops have the potential for high returns; however, high-yielding wheat varieties hold similar potential. In fact, cereal crops, such as wheat, are required in rotation with oilseed and special crops for disease control purposes.

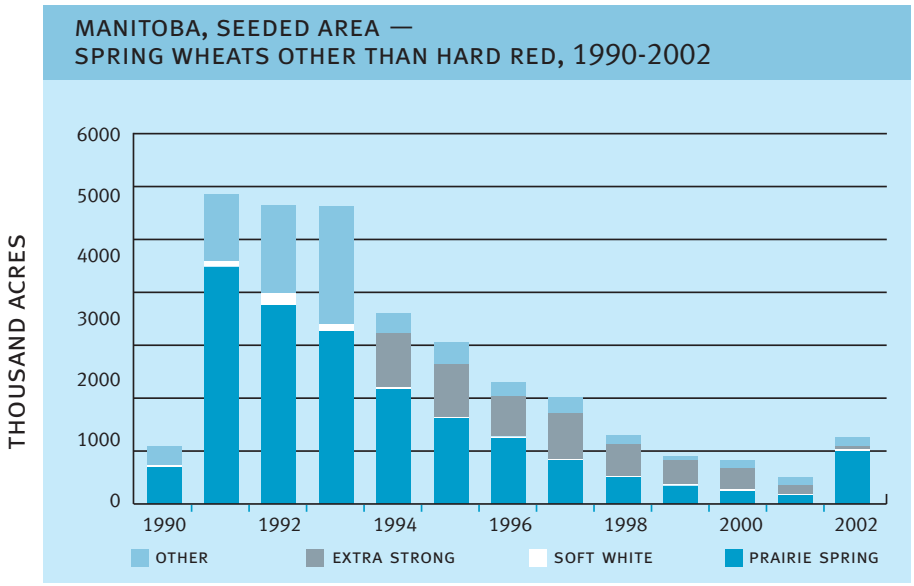
MANITOBA, SEEDED AREA – ALL WHEATS, 1990-2002



(NOTE: STATUTORY FREIGHT RATE CHANGE OCCURRED MID-1994)

Market Analysis & Statistics Section, Manitoba Agriculture and Food

The graph above reveals that as recently as 1992, Manitoba farmers cultivated approximately 2.0 million more acres of wheat than they do today. This is a strong indication that Manitoba farmers have the capacity to produce sufficient quantities of wheat to meet the growing demand for both the livestock and ethanol industries in Manitoba.



(NOTE: STATUTORY FREIGHT RATE CHANGE OCCURRED MID-1994)

Market Analysis & Statistics Section, Manitoba Agriculture and Food

The graph above demonstrates farmers' ability and willingness to grow the class of wheat that shows the possibility of a positive market return. For example, between 1990 and 1991, farmers increased production of other wheats by approximately one million acres. This is more than double the amount required to meet Manitoba's entire domestic ethanol market.

In addition, the panel noted that ownership structures, such as new generation co-ops, that result in owners making contractual commitments to supplying feed grain to the ethanol plant, help to ensure adequate feedstock. Nevertheless, periodic shortages of feed grain are a reality of business, and one that Manitoba's livestock sector is familiar with. In the event of significantly decreased yields in Manitoba, the province's access to cost-effective imports of U.S. corn can be a competitive advantage to the ethanol industry, as it currently is to the livestock industry. The increased availability of distillers' grain, as a valuable source of protein to the livestock industry, is also anticipated to be a factor in providing additional options and stability to livestock feed prices. The high-protein distillers' grain can be blended with lower quality grains and forages to provide inexpensive, balanced rations for growing and further finishing of different livestock species. This has the potential to significantly increase the number of cattle finished in Manitoba.

Therefore, regarding the issue that additional demand for feed grain will require both the livestock and ethanol industries to increase imports, the panel recommends:

➔ ***that the Manitoba government support wheat variety research and promotion targeted at producing higher yielding* feed wheat varieties, which farmers can grow to support ethanol production.***

* Based on historical prices, a yield advantage of approximately 30 per-cent over milling wheat varieties is required to achieve similar returns from feed wheat varieties.

FIBRE/BIO-MASS

Ethanol can also be created from bio-mass fibre such as straw, grass or wood by the conversion of cellulose, or hemi-cellulose, to starches and sugars, using enzymes and converting these sugars to ethanol. The major co-product of this process is lignin, which is burned to produce steam for the process, with the excess potentially being converted to electricity for sale to the grid. This process for creating ethanol holds much future promise as an economic source of ethanol, and is currently the focus of considerable technical developmental research and demonstration effort. However, it is not yet considered ready for market applications.

There is much speculation as to when it will be a marketable technology, using either waste bio-mass or crops specifically grown as feedstocks, for the process. Some proponents of the bio-mass-ethanol process indicate that a plant using this technology may be operational in as little as two years. Should bio-mass plants become viable in Manitoba, it is likely that they would use straw as a source of bio-mass, and possibly switch grass as a locally grown energy crop, to produce ethanol. Studies carried out in the Killarney area of the province indicate that there is sufficient bio-mass available to support a world-class facility, producing approximately 220 million litres of ethanol annually. In addition, trials are taking place regarding the ability to establish switch grass as an energy crop upon which to base ethanol production.

Straw may become a commercially viable feedstock in the near future

In preparing its report, the panel deliberated over the potential risk of recommending the development of a grain-based fuel ethanol industry, given the potential for bio-mass to produce cheaper ethanol. In recommending that the government develop a grain-based ethanol industry, rather than wait for the commercialization of a bio-mass-to-ethanol industry, the panel considered the following:

- There is a risk that commercial bio-mass-ethanol facilities may not be built for some time in Manitoba, due to the length of time it takes to prove the technology on a commercial scale.
- Manitoba is only one of the potential sites being considered for a world-scale bio-mass-to-ethanol plant, and there is no certainty that it will indeed be the site of such a plant.
- Delays in developing Manitoba's ethanol industry could result in an inability to take advantage of early entry into what appears to be a fast-evolving industry in North America.
- Expanding ethanol markets in North America, in combination with different co-products produced by the bio-mass and grain process, means that both technologies should be viable in the foreseeable future, rather than one process completely dominating the other, based on ethanol production costs.

Based on the information available, it appears that should the cellulose-based technology prove technically and economically viable, the feedstock resource will be available.

Therefore the panel recommends:

- ***that the Manitoba government continue to work with developers of fibre-based ethanol production processes to ensure that as technical advances occur, Manitoba is positioned to take advantage of opportunities based on its current waste-fibre feedstocks and its potential for dedicated energy crops; and***
- ***that the Manitoba government continue working co-operatively with rural communities in their attempts to attract a straw-based ethanol plant in their regions.***

Co-Products

Only the starch component of the grain is converted to ethanol. The fibre, protein, minerals, carbon dioxide (CO_2) and vitamins remain. These components all have some value and it is important, for the overall economics of the facility, to be able to capture that value. Grain-based ethanol plants traditionally produce two products in addition to ethanol — distillers' grains, either wet or dry, and CO_2. The quantities of each product are almost equal on a mass basis, so it is important to insure that there are high-value markets for as much of these products as possible.

Distillers' Grains

Distillers' grains are used as a high-protein feed in the livestock industry. The price and markets for wheat distillers' grains will depend on protein content and the ability of the product to be priced competitively, compared to other protein supplements currently imported for use in Manitoba's livestock industry. Wheat DDG (distillers' dried grain) is higher in protein than soymeal and therefore could potentially obtain a premium price, subject to low levels of fusarium.

Distillers' Dry Grain ready for transport

Truck hauling distillers' grain

Import statistics show that Manitoba is the largest importer of soybean meal in the prairie provinces, but it is believed that a portion is moved to Saskatchewan and Alberta after it enters Manitoba. The 150,000 tonnes of DDG, that would be produced at ethanol facilities capable of producing 160 million litres of fuel ethanol for Manitoba, could replace the protein content of 110,000 tonnes of soybean meal or 40.0 per-cent of the soybean meal imports into western Canada.

The potential for growth exists in many of Manitoba's livestock sectors that are candidates for the use of distillers' grains in their feed rations. (It should be noted that the table on the following page, illustrating livestock numbers and DDG feed rates, understates the livestock impact. The number of animals produced each year is higher than shown in the table, since many have life spans of less than one year.) The hog sector has been growing rapidly, with annual growth rates of 14 to 18 per-cent between 1998 and 2001. In the cattle sector, only one-third of the calves produced are fed to slaughter weight within the province. Greater supplies of wheat DDG could provide additional opportunity to add value to more calves before they are sold.

Wheat DDG has primarily been used in the beef and dairy sectors in western Canada. There is little experience with it in the swine and poultry sectors. There is a rapidly increasing body of knowledge in the U.S. on feeding corn DDG to hogs and poultry. There is a need for this type of research in Canada since both the DDG, and the rations themselves, are different, with less corn found in Canadian rations.

The range of DDG inclusion rates in livestock rations are summarized in the following table. The typical rates are combined with the livestock populations to determine the theoretical market for DDG in Manitoba. The total is much higher than what would be produced by an ethanol industry sized to meet Manitoba's ethanol needs. Some development work would need to be done, particularly in the swine sector, to realize this potential. In addition, considerable marketing effort would be required for these potentials to be realized.

Use of wheat DDG within Manitoba would boost the economic benefits of an increased ethanol industry to the province, as the locally produced protein supplements would be used within the local economy, displacing imports. The potential also exists to expand these local livestock markets, resulting in additional benefits to Manitoba's agricultural economy.

DDG Feed Rates

Species	Animal Population	Range of DDG Feed Rates, (lbs./day)	Maximum Annual Consumption (tonnes)	Reasonable Annual Consumption (tonnes)
Dairy Cows	35,000	4-12	40,000	20,000
Cattle	550,000	0-9	135,000	45,000
Swine	2,700,000	0.4-0.8	400,000	150,000 (See Below)
Turkey	700,000	0.05-0.10	10,000	5,000
Chickens	10,000,000	0.006-.024	5,000	2,000
Other			10,000	5,000
Total			**600,000**	**227,000**

Source: S&T Consultants

Central to the success of utilizing distillers' grains within the Manitoba market is their potential use in the swine sector. To realize the benefits of local use, it is essential to understand the feed requirements of this sector (the unique properties of wheat DDG and how it can be included in swine rations), and how to market wheat DDG to the feed industry. If this situation does not develop, for any reason, distillers' grains will have to be dried and shipped to export markets.

The potential DDG markets in the other western Canadian markets are also underserved. While Manitoba has the largest swine population in the west, the dairy industries in Alberta and BC are three to four times larger than Manitoba's, and the cattle industries in Saskatchewan and Alberta are two to five times larger than Manitoba's.

Manitoba DDG will be wheat DDG that has a protein level of 35 per-cent and an amino acid profile quite different than that of 27 per-cent protein corn DDG. It may be possible to find markets in the U.S. where the wheat DDG could be established as a unique product, in spite of the relative abundance of corn DDG (S&T Consultants).

Selling DDG from Manitoba ethanol plants at reasonable prices should not be a constraint on the industry. The Manitoba market can be developed through research into swine diets and good marketing of the product attributes to the dairy and beef cattle sectors. There is also the opportunity to export this unique product to other Canadian provinces and to the U.S. at prices that will provide returns similar to those received in the provincial market.

The potential exists for developing markets for distillers' grains both within Manitoba's livestock industry and for export. However, the panel recognizes that considerable technical development and marketing must take place to establish these markets.

Therefore, the panel recommends the following as part of Manitoba's ethanol development strategy:

- ***that the Manitoba government immediately undertake research to characterize and document the nutritional value and marketability of distillers' grains within the dairy, beef, swine, and poultry industries;***
- ***that the Manitoba government commit to developing communications, marketing and extension programs to assist producers, feed suppliers, and other local and export industry participants, in understanding the benefits of using wheat distillers' grains; and***
- ***that the Manitoba government commit to working with proponents of integrated ethanol/livestock plants, and other large consumers of distillers' grains, to understand the regulations and options for siting intensive livestock operations.***

Fusarium

Fusarium head blight (FHB) was raised as an issue affecting feedstock quality. FHB-infected feedstock can lower the quality of the DG co-product. This is of particular concern, as markets for high-value co-products of ethanol production, such as distillers' grains, must be available for an ethanol facility to be economically viable.

Fusarium head blight exists virtually everywhere in agro-Manitoba, appearing when the appropriate weather and crop development conditions occur. The disease limits the use of distillers' grains, although not all animals are affected in the same way. Beef cattle, sheep and poultry are less sensitive to fusarium infected DG, accepting levels of up to 5 parts per million (ppm) in their feed. Swine, dairy cattle and horses are less tolerant — the standard for them is only 1 ppm.

Currently, the issue of fusarium-infected wheat is dealt with by mixing infected wheat with non-infected wheat at levels that dilute the fusarium to within acceptable standards for livestock consumption.

The ethanol production process used at the Minnedosa facility only partly detoxifies contaminated wheat. Newer facilities use a cooking system which operates at higher temperatures. Some of these systems also utilize additional chemicals and acids, which may assist in detoxifying distillers' grains. Further research on these systems is required to ascertain if ethanol plants using these systems can produce detoxified distillers' grains. If they can, these lower value grains could find a market in ethanol plants.

Another potential avenue for dealing with this issue is conducting research and licensing fusarium-resistant varieties of wheat. There have also been some attempts to separate the toxins from the grain, and to then utilize only the non-infected grain.

Given the potential negative impact of fusarium head blight on the long-term economic viability of a grain-based ethanol industry, the panel recommends that the government's long-term ethanol production development strategy include:

- ***proactive engagement of the federal government and industry to develop and introduce fusarium-resistant varieties of wheat;***
- ***advocating changes to the regulatory system to foster the approval of existing and new varieties of disease-resistant wheat, in a manner that maintains the integrity of the markets for both export milling wheat and wheat used for producing ethanol; and***
- ***undertaking research to examine/develop alternative ethanol production methods for utilizing fusarium-infected wheat that will result in eliminating the toxins from the distillers' grains during the process.***

Oil field pump jacks

Carbon Dioxide

Carbon dioxide is produced during fermentation at the same time as ethanol. Essentially equal weights of carbon dioxide and ethanol are produced in the process, but the recovery process for carbon dioxide is not quite as efficient as the ethanol recovery process.

The carbon dioxide business is traditionally thought of as the recovery and distribution of liquid carbon dioxide, since this is the product most commonly bought and sold. The market for carbon dioxide in the prairies is served by three Praxair plants—in Fort Saskatchewan, Cochrane, Alberta and Brandon, Manitoba—and one Air Liquide plant in Fort Saskatchewan. The equipment required to capture carbon dioxide can be costly and would likely not be economical in a small plant scenario. Carbon dioxide, captured at an 80 million litre facility, would generate $1.1 million per year in additional revenue, assuming a selling price of $15 per tonne.

A unique opportunity was identified, where carbon dioxide, produced at an ethanol plant, is used in Manitoba's oil patch, due to the geological characteristics of the field. However, considerable additional feasibility work is required to define the business case for such an option in Manitoba.

Other Potential Co-product Opportunities

There are several wheat ethanol plants in the U.S. and Canada that produce wheat gluten along with ethanol and other valuable co-products. This is somewhat of a natural fit since the gluten is mostly the wheat protein and the ethanol is produced from the starch portion of the wheat. Although at present, there appears to be a sufficient supply of wheat gluten on the international market, potential developers of ethanol plants should examine this market closely as it may become a significant future opportunity.

Cattle feeding on distillers' grain rations

There is potential to develop new products from the parts of the grain that do not get converted to ethanol. The development of new products from fuel ethanol residues will reduce the net cost of the ethanol. The challenge is that it often takes some time for the markets for these products to develop. In the longer term, the expectations for outcomes from research include higher-value co-products. Envisioned co-products include specialty oils, novel polysaccharides that will compete with imported gums, sugar alcohol food additives (which are currently imported), enzymes, enzyme inhibitors, mycotoxins, cinnamates, vitamin E, beta-glucan, glycerides, lectin, fibre, wheat germ, phytic acid (medical applications) and inexpensive aquaculture feeds.

Recognizing the value-added potential of new co-product development—including potential co-products from fibre-based plants, and the longer term research and market development that must take place for them to be achieved—the panel recommends that:

- ***the Manitoba government partner with the federal government, other jurisdictions and industry to create a research strategy to develop additional, value-added co-products related to the production of ethanol.***

Ownership

There are currently three broad ownership models represented in the ethanol industry in North America. They are:

Industry Owned - This model refers to a plant that is wholly owned by an external company with most, if not all, the capital for the construction and operation of the plant, provided by the company.

Limited Partnership - This type of ownership includes a shared ownership arrangement between an external company and local investors or farmers, with local ownership usually in a minority position. Under a limited partnership, delivery rights are sometimes obtained for local investors; however, the overall operation and management of the facility is conducted by the company.

Co-ops - There are different co-op models. They all include some form of farmer ownership in all, or a portion, of an ethanol facility.

Manitobans clearly expressed to the panel that they wished to have an opportunity to participate in the ethanol industry through direct or indirect ownership of an ethanol plant. In many instances, the new generation co-operative (NGC) ownership model was cited as a means of achieving this goal.

One wheat grower presented his views to the panel in the following way:

> *"Being able to own shares in an ethanol facility will be good for farmers. If the price of the wheat that I am growing is high, then I am pleased. If the price of wheat is low, then at least I know that my earnings from my ownership in the ethanol plant will be increased. Either way I win."*

Following the consultation process, the panel had the opportunity to visit a large, farmer-owned, new-generation co-op in southern Minnesota. This successful ethanol production facility is owned by 340 local farmers and produces approximately 110 million litres per year. Under this new-generation co-op arrangement, farmers are committed to providing the necessary feedstocks to supply the facility. This results in a guaranteed market for participating producers and a secure source of feedstock for the plant. In addition, this plant was a member of an ethanol and DDG marketing co-op with surrounding ethanol facilities.

Panel member Teri Nicholson (3rd from left) with members of Manitoba Governments' Ethanol Initiative

As the panel's understanding of the ethanol industry grew, we realized that maximizing the benefits to Manitobans did not necessarily mean that smaller plants were preferable to larger plants. Rather, Manitobans would receive the greatest benefits from participating in the ownership of facilities located in their area.

There are several possible applications of the co-op model in building an ethanol industry in Manitoba. Farmers could come together and establish a traditional co-op, with a contract to deliver feedstocks to the ethanol production facility, without taking an ownership position in the facility. This co-op model provides flexibility and a guaranteed market for the agricultural producers, along with a guaranteed feedstock for the ethanol producer, without a significant capital outlay by the farmer-members. However, it does not provide those farmer members with the benefits of owning the facility.

NGCs build on the traditional co-op model but allow for equity participation by the agricultural producers who are providing the feedstock. A share purchased in a plant usually means a commitment by the new-generation co-op member to provide a specific quantity of feedstock, directly related to the local equity investment in the facility. For more on co-ops and NGCs, visit www.manitobaenergy.com

It is the panel's view that Manitobans would benefit from having access to more information on the benefits of NGCs.

The panel recommends that the government of Manitoba develop a strategy designed to enable co-operatives and/or NGCs, to develop and thrive in Manitoba. This includes:

- ***increasing staff capacity to provide advice and expertise to groups wanting to explore the co-operative option;***
- ***establishing educational components for communities and agricultural producers to enable them to better understand the principles of NGCs and traditional co-operatives; and***
- ***reviewing the current regulatory system to ensure that there are no obstacles to the creation of NGCs.***

Local farmer delivers grain to an ethanol production facility in Minnesota

While 100 per-cent producer ownership is most desirable, it may not always be practical. Other established private investors, including those already in the ethanol business, can be valuable partners, bringing both substantial investment and expertise to a project. Such privately owned companies have expressed openness to the idea of partnering with agricultural producers and other Manitobans in joint ventures.

Communities seeking to build or attract an ethanol facility will need to be creative to raise the required capital. Potential vehicles to generate local capital include:

- raising money from producers who will be providing the feed-stocks—this could be done directly, or through some type of check-off program, allowing producers to set aside a few cents per bushel of grain
- joining with groups in other communities and regions who are looking to attract or build an ethanol facility
- Manitoba's Labour Sponsored Investment Funds
- related industries that may be interested in some form of vertical integration

The panel recommends that the government of Manitoba emphasize its desire to have the industry locally financed by:

- ***requiring that projects demonstrate a substantial amount of local ownership to be eligible for incentives;***
- ***offering increased support to projects that demonstrate 50 per-cent or more local ownership;***
- ***advising communities seeking to raise capital that they consider approaching Manitoba's Labour Sponsored Investment Funds and other venture capital funds in Manitoba; and***
- ***asking agricultural producer groups to consider offering some form of voluntary "check-off" program, to give their members an opportunity to conveniently invest in an ethanol facility.***

"The economic benefits of ethanol production go far beyond the jobs at the plant site. In our work, we toured several ethanol production facilities. It was nice to see service personnel, like electricians from the surrounding communities, coming and going from the plant site. These are the types of indirect economic activities that will benefit rural Manitoba."

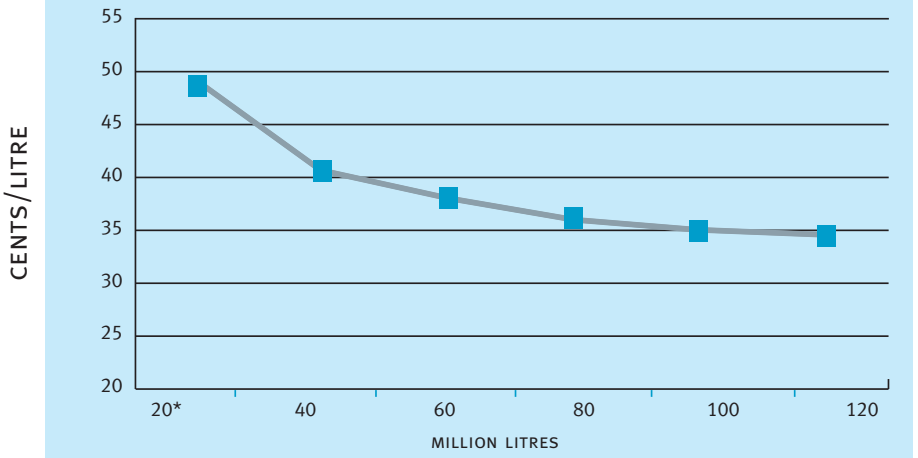
Teri Nicholson – Panel Member

Small Facilities

Manitobans clearly told us that they preferred to see an ethanol industry that consisted mostly of small production facilities. A plant with the capacity to produce 20 million litres per year is generally considered to be small. Through the course of our consultations and policy work, we discovered the following:

- The cost of producing ethanol in a stand-alone, 20 million-litre facility is significantly greater on a per litre basis than in a larger facility. Therefore, smaller facilities could require increased government incentives.
- Smaller plants provide greater economic development than larger plants on a comparative basis.
- A small plant in the U.S. is considered to be 30 million US gallons or 110 million litres.
- There are virtually no examples of successful stand-alone 20 million-litre-per-year plants in the U.S. The only exceptions are facilities that received cheap or free "waste feedstock" (unwanted by-product from a nearby manufacturing facility) or plants that were either co-located with a feedlot or located in very close proximity to a feedlot.
- The economics of a small ethanol plant improve substantially when integrated with a feedlot .

ETHANOL PRODUCTION COSTS BY PLANT SIZE



* THE 20 MILLION LITRE FIGURE REPRESENTS A NON-INTEGRATED, STAND-ALONE ETHANOL FACILITY

SOURCE: S&T CONSULTANTS

The majority of information received by the panel indicated that the economic viability of small, non-integrated plants, as compared to larger facilities, is questionable.

Therefore, the panel recommends:

- ***that the economics of investing in smaller facilities be investigated thoroughly before investment decisions are made—furthermore, small plants should be integrated with, for example, a feedlot, or located close to existing feedlots, to eliminate drying costs of the distillers' grain.***

Other Issues

Throughout the consultation process, the public response to the government's ethanol initiative was overwhelmingly positive. However, a number of issues and suggestions were raised that challenged the province to do more to reduce harmful greenhouse gases.

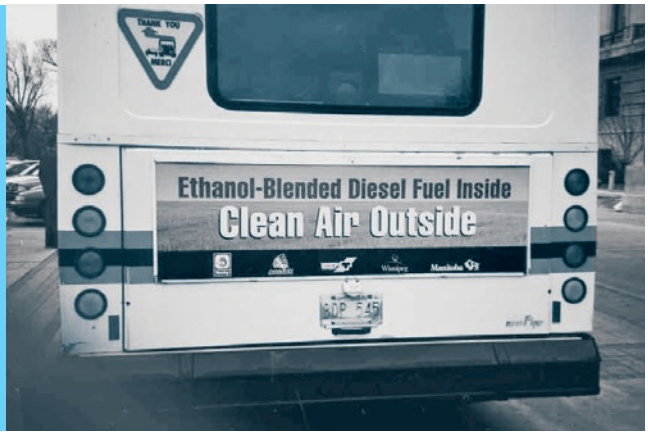
Suggestions included expanded use of the following fuels:

1. *Bio-diesel* - fuel derived from a mixture of diesel fuel blended with, for example, soybean oil, canola oil and/or oils derived from animal fats
2. *E-diesel* - ethanol blended with diesel fuel and co-solvent, usually at lower percentages
3. *E-85* - gasoline fuel blends containing 85 per-cent ethanol

Some presenters discussed the possibility that an increased availability of wheat DG may encourage more cattle finishing in Manitoba. Ultimately, this could lead to a re-established slaughter industry for the province.

Although recommendations respecting these issues fall outside the panel's mandate, it is recommended that in the future:

- ***the government investigate the potential for encouraging the production and use of bio-diesel, E-diesel and E-85 in Manitoba; and***
- ***the government examine the increased opportunities for cattle finishing and processing that may result from increased DG production.***



Ethanol-blended diesel transit bus trial

Supporting Ethanol Development in Manitoba

For ethanol production to be sustainable in Manitoba, the provincial government will need to examine ways to support the industry.

Current Ethanol Production in Manitoba

Since 1980, Manitoba has provided an incentive for ethanol produced and consumed in Manitoba. This incentive was designed to recognize the industry in Manitoba as it existed at that time. As a result, an ethanol producer in Manitoba, who is not engaged in the distribution or retail of gasohol, does not currently qualify for the tax preference.

Moreover, despite having the most generous incentive in the industry, the Manitoba ethanol scene has not changed for over two decades. However, since the announcement of an ethanol mandate in the 2002 Budget , there has been a renewed interest by the oil industry, and ethanol producers from across North America, in building ethanol plants in Manitoba. Accordingly, changes to the gasoline tax preference for gasohol will need to be made to accommodate prospective alterations to the ethanol industry in Manitoba — namely, ethanol production-only business activities.

Currently, the provincial government offers its lone producer of ethanol an incentive of 2.5 cents per litre of gasoline blended with 10 per-cent ethanol. The economics of producing ethanol are such that these small facilities would not be economically viable in comparison to newer and more appropriately sized facilities. Therefore, the panel is hesitant to encourage facilities with such low capacity. Furthermore, in choosing to expand the production and consumption of ethanol in Manitoba, the Manitoba government is greatly increasing its overall support for the industry.

The panel therefore recommends the following:

- ***that the existing incentive level be grandparented at Manitoba's only existing plant for up to 10 million litres per year until the year 2010, at which time the exemption should be re-evaluated.***

Incentives

The Canadian federal government currently provides an ethanol consumption incentive of $.10 per litre while the U.S. federal government provides an equivalent of $.23 CDN per litre. The ethanol industry in the U.S. credits this incentive as being integral to the establishment of an ethanol industry in the U.S. Furthermore a low federal incentive inhibits inter-provincial trade.

Recently, as part of its Climate Change Action Plan, the federal government established a target that 35 per-cent of fuel sold in Canada contain a 10 per-cent ethanol blend. Although the federal government has not clarifed how this target will be met, it is anticipated that this goal will be clarified in the upcoming federal budget.

Therefore, the panel makes the following recommendations:

- ***that the Province of Manitoba lobby the federal government to provide incentives for ethanol production that are at least equal to the incentives provided by the U.S. federal government; and***
- ***that a combined federal/provincial incentive be established at a level which ensures that Manitoba is competitive with its neighbouring jurisdictions. The province's portion should be only for ethanol that is produced and consumed within Manitoba.***

Ethanol storage tank

"In order to achieve the maximum benefit from the ethanol industry in Manitoba, we need to strike a balance between the cost of incentives and the benefits of encouraging locally owned and controlled plants, which utilize locally grown inputs without negatively impacting feedstock supply to Manitoba's livestock industry. "

Garth Manness - Panel Chair

While we are not specialists in the area of government incentives, we find the combined incentive of approximately $.25 per litre of pure ethanol (similar to what is offered in Ontario and Saskatchewan) to be reasonable. The panel agrees that this level of incentive will best:

- provide a basis to encourage investment in Manitoba;
- minimize the total impact on the provincial treasury; and
- compare equitably to neighbouring jurisdictions.

The panel has chosen a combined level of incentive in the event that the federal government increases its incentive. If this occured, it would be prudent to see the provincial government decrease its incentive so that the overall level would remain unchanged.

The panel would like to caution the government that producing ethanol depends on many variables. For example, in terms of input, both the cost of natural gas and the value of feedstocks are extremely volatile. The selling price of ethanol is determined by the rack price of gasoline, which is also highly volatile. In addition, the selling prices of DDGs vary greatly on the world market. As a result, a set incentive level may be too generous for one period of time and insufficient in another period.

Therefore, the panel recommends:

- ***that the government continue monitoring the fluctuations in the prices of inputs and products of the ethanol industry and conduct research to find the most appropriate method of applying incentives; and***
- ***that once the full mandate has been achieved, the government of Manitoba evaluate the economic benefits of its ethanol program and compare it to the costs, including the foregone fuel tax revenue. Greenhouse gas emission reductions should also be documented.***

The panel encourages the Manitoba government to think creatively about how it can provide its portion of the combined incentive. For example, it could reduce fuel tax rates by the amount of the incentive for gasoline blended with 10 per-cent ethanol. Another option would be for the government to forego certain taxes until capital costs have been recouped and the industry has been established.

Alternatively, the government should consider implementing a surtax on unblended gasoline that would recognize it as an imported and non-renewable product. This would address the prospective revenue shortfall. There is precedent for this type of measure in Manitoba. A 1.8 cents per litre gasoline surtax was imposed on leaded gasoline during the period leading up to its phase-out. This option would give individual consumers the unique opportunity to choose the level of taxation they are willing to pay. As a result, consumers would effectively be driving the ethanol market. Under this measure, gasoline that did not contain the specified proportion of ethanol would be similarly subjected to a gasoline surtax on top of the regular gasoline tax rate of 11.5 cents per litre. The amount of the surtax would depend on the province's fiscal requirements and obligations, but it should not exceed the revenue foregone under the gasohol tax preference for producers.

The following table suggests that Manitoba has some latitude to apply this strategy and still maintain levels of fuel taxes that are below neighbouring provinces:

Current Gasoline Tax Levels

Current Gas Tax			
	Ontario	Saskatchewan	Manitoba
Cents/litre	14.7	14.5	11.5

Source: Manitoba Finance

Increasing Ethanol Market Penetration

Currently in Manitoba, ethanol-blended gasoline makes up less than five per-cent of the gasoline fuel market. A sound strategy during the transition to a full mandate will involve matching new production levels with consumption. The petroleum industry asked that if the government chose to pursue a mandate, it be done in a way that would allow them some flexibility in distributing the ethanol to improve efficiency in delivery. The panel also recommends that unblended gasoline still be available in the province.

Feedlot

Manitoba Government ethanol publications

The panel therefore recommends that:

- ***the province announce that by September 1, 2005, 85 per-cent of the gasoline in the province be blended with 10 per-cent ethanol. As an intermediate step, we recommend that distributors be required to blend ethanol with gasoline resulting in 5.0 per-cent of the total volume sold in the province being ethanol—in the period between January 1, 2005 and August 31, 2005; and***
- ***the government of Manitoba enter into dialogue with industry and other stakeholders once the 85 per-cent requirement has been achieved, to determine whether or not moving to 100 per-cent market penetration would be in the best interest of the province and other stakeholders.***

Communications

Throughout the consultations, the panel received numerous comments about the need for both the public, and industry, to have access to one source of clear, technically accurate information, respecting all aspects of ethanol—from simple public information requests to detailed development information. Furthermore, the panel discovered that there is considerable misinformation about the production and use of ethanol, resulting in confusion within both the public and industry. In examining options for dealing with the communications issues involved in developing an ethanol production and consumption strategy, the panel noticed that many U.S. jurisdictions have used effective communications strategies to both promote the use of ethanol and dispel many popular misconceptions about the production and use of this fuel.

Based on the concerns expressed in the public consultations, and the success that other jurisdictions developing ethanol industries have had in dealing with such issues, the panel recommends the following:

- ***that the government immediately establish an Ethanol Office within the newly established Department of Energy, Science and Technology, to be the one-stop-shop that works with communities, and delivers information to the general public and industry on all aspects of ethanol use and ethanol industry development for the province.***
- ***that the government specifically authorize the Manitoba Ethanol Office to:***
  - ***a) examine communications strategies used in other jurisdictions that have developed their ethanol production and consumption industries;***
  - ***b) co-ordinate all research and development activities associated with expanding the ethanol industry in Manitoba;***
  - ***c) liaise with the federal government, other jurisdictions and other provincial departments, to explore opportunities for joint funding of co-operative communication programs, which will be delivered in Manitoba through the Manitoba Ethanol Office; and***
  - ***d) develop a strong campaign focused on the economic and environmental impacts of increased ethanol production and consumption—the campaign should include, but not be limited to, the development, dissemination and use of materials at schools, in the community, and at industry and potential investor workshops and seminars.***
- ***that this new organization be established and prepared to meet with communities immediately following the release of the government's ethanol policy; and***

Loading wet distillers' grain

→ ***that the Minister of Energy, Science and Technology, and the Manitoba Ethanol Office specifically, be responsible for working with the government of Saskatchewan, the federal government, and the petroleum refinery industry, to develop a specification for the base gasoline to be blended with denatured ethanol to create a gasohol blend that maximizes the benefits of the oxygenate, octane, and other characteristics of 10 per-cent ethanol blends.***

Legislation and Regulations

Although there were instances during the public consultations where participants were not supportive of a legislated mandate, they were the exception. Stakeholders' views on this issue often depended on whether they stood to gain from a mandate, or perceived a mandate to be in conflict with their current operations.

Opposition to a legislated mandate generally fell within the following parameters:

- ✔ a philosophical preference for market forces compared to legislated mandates and regulations, which were seen as economically inefficient
- ✔ a concern that mandates would limit the choices of fuels, coupled with a concern that ethanol blends would have adverse effects on the operation of vehicles
- ✔ a concern that not enough ethanol would be available to meet a mandated time frame
- ✔ a concern that regulations would be onerous

Legislation and regulations dealing with ethanol in other jurisdictions run a broad spectrum, from explicit mandates for renewable fuels to regulations governing the operation of incentive programs designed to increase either the production or use of ethanol, or both. Legislation that explicitly mandates renewable transportation fuels, or ethanol-blended fuels, is currently limited (in the North American context) to the states of Minnesota and Hawaii and the province of Saskatchewan.

Based on the comments received during the consultation process, and an examination of mandates in other jurisdictions, the panel recommends:

Manitoba Legislature

→ ***that the government develop and introduce enabling legislation related to renewable transportation fuels.***

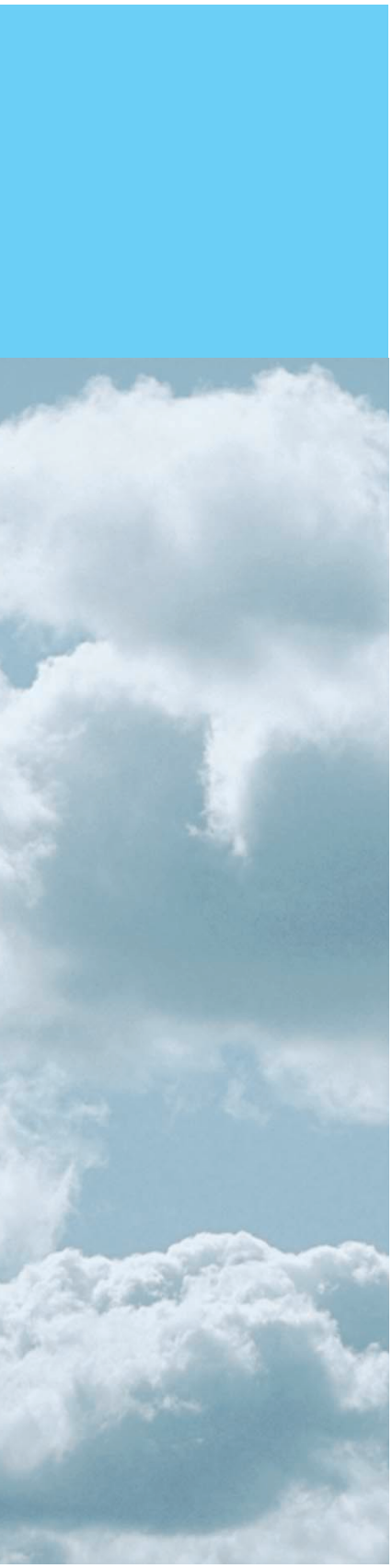
The panel further recommends:

→ ***that this legislation should assign ethanol development responsibility to the newly established Department of Energy, Science and Technology, as well as outline the authorities and responsibilities for that department regarding:***

- ✔ ***examination of ethanol policies and development of regulations establishing producer and/or consumer incentives, their amount, and duration;***
- ✔ ***research and demonstration projects in Manitoba's ethanol industry;***
- ✔ ***the development and implementation of communication activities related to consumer awareness campaigns about ethanol; and***
- ✔ ***the establishment of regulations under the proposed legislation for the operation of programs, or procedures developed to administer the legislation.***

→ ***that the legislation include a duty to report to the legislature on issues related to mandated renewable transportation fuels.***

Summary of Recommendations



The Manitoba Advantage

- ***The panel recommends that the province extend the 10 per-cent manufacturing investment tax credit for a long enough period to accommodate the construction of the ethanol plants needed to fulfill a mandate in Manitoba; and***
- ***That the overall Manitoba advantages (including the wheat-to-ethanol advantage) be documented and promoted throughout North America to encourage an export industry.***

The Environment

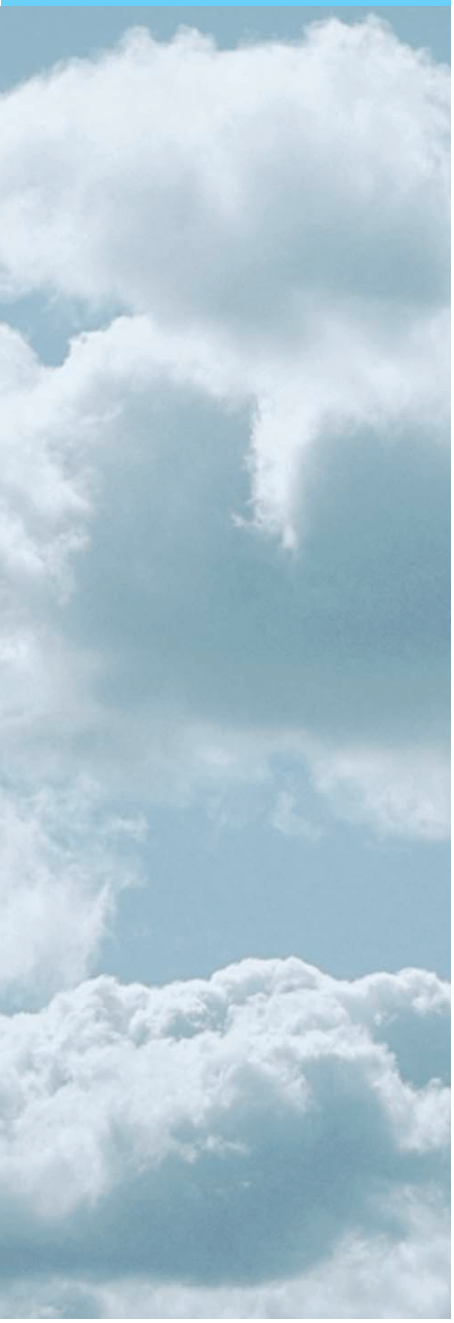
- ***The panel recommends that environmental pollution control technologies that provide the best available controls be required in the construction of each new plant in Manitoba;***
- ***That the government emphasize, as part of its larger public education campaign, the net environmental benefits of increased ethanol use; and***
- ***That in light of the Canadian Government's recently announced commitment to ratify the Kyoto Protocol, the provincial government urge the federal government to institute a national ethanol mandate.***

Feedstocks

- ***The panel recommends that the Manitoba government support wheat variety research and promotion targeted at producing higher yielding feed wheat varieties, which farmers can grow to support ethanol production;***
- ***That the Manitoba government continue to work with developers of fibre-based ethanol production processes to ensure that as technical advances occur, Manitoba is positioned to take advantage of opportunities based on its current waste-fibre feedstocks and its potential for dedicated energy crops; and***
- ***That the Manitoba government continue working co-operatively with rural communities in their attempts to attract a straw-based ethanol plant.***

Co-Products

- ***The panel recommends that the Manitoba government immediately undertake research to characterize and document the nutritional value and marketability of distillers' grains within the dairy, beef, swine, and poultry industries;***
- ***That the Manitoba government commit to develop communications, marketing, and extension programs to assist producers, feed suppliers, and other local and export industry participants in understanding and accepting the benefits of using wheat distillers' grains; and***
- ***That the Manitoba government commit to working with proponents of integrated ethanol/livestock plants, and other large consumers of distillers' grains, to understand the regulations and options for siting intensive livestock operations.***
- ***The panel recommends that the government's long-term ethanol production development strategy should include:***
  - ✔ ***Proactive engagement of the federal government and industry to develop and introduce fusarium-resistant varieties of wheat; and***
  - ✔ ***Advocating changes to the regulatory system to foster the approval of existing and new varieties of disease-resistant wheat, in a manner that maintains the integrity of the markets for both export milling wheat and wheat used for producing ethanol.***



- ***The panel also recommends that the province undertake research to examine/develop alternative ethanol production methods for utilizing fusarium-infected wheat that will result in eliminating the toxins from distillers' grains during the process; and***
- ***That the Manitoba government partner with the federal government, other jurisdictions, and industry to create a research strategy to develop additional value-added co-products related to the production of ethanol.***

Ownership

- ***The panel recommends that the government of Manitoba develop a strategy designed to enable co-operatives and/or new generation co-ops (NGCs), to develop and thrive in Manitoba. This includes:***
  - ✔ ***increasing staff capacity to provide advice and expertise to groups wanting to explore the co-operative option;***
  - ✔ ***establishing educational components for communities and agricultural producers to enable them to better understand the principles of NGCs and traditional co-operatives; and***
  - ✔ ***reviewing the current regulatory system to ensure that there are no obstacles to the creation of NGCs.***

The panel also recommends that the government emphasize its desire to have the industry locally financed by:

- ✔ ***requiring that projects demonstrate a substantial amount of local ownership to be eligible for incentives;***
- ✔ ***offering increased support to projects that demonstrate 50 per-cent or more local ownership;***
- ✔ ***asking communities wishing to raise capital that they consider approaching Manitoba's Labour Sponsored Investment Funds; and***
- ✔ ***asking agricultural producer groups to consider offering some form of voluntary "check-off" program to give their members an opportunity to conveniently invest in an ethanol facility.***

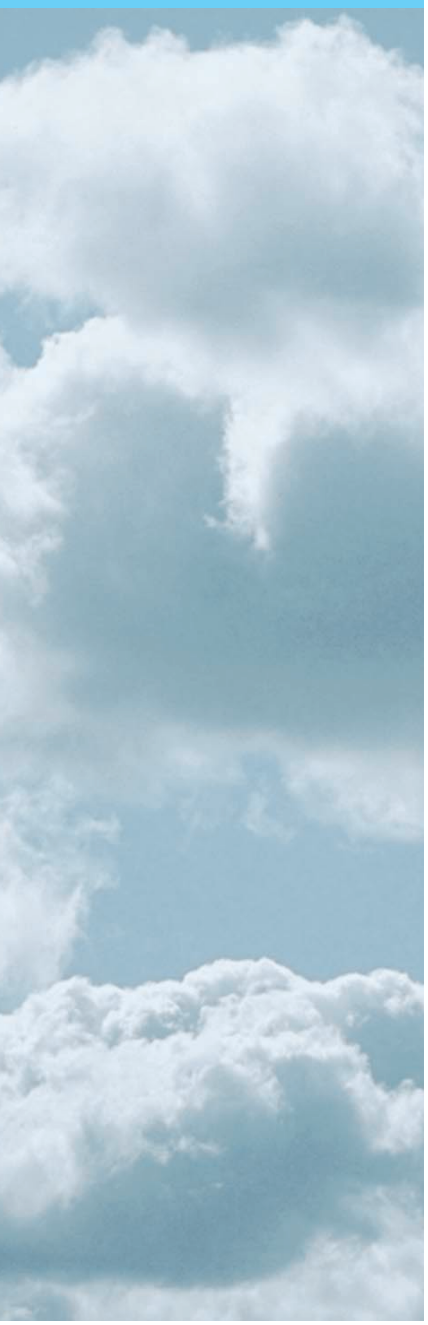
- ***The panel further recommends that the economics of investing in smaller facilities be investigated thoroughly before investment decisions are made. Furthermore, small plants should be integrated with, for example, a feedlot, or located close to existing feedlots, to eliminate drying costs of the distillers' grain.***

Other Issues

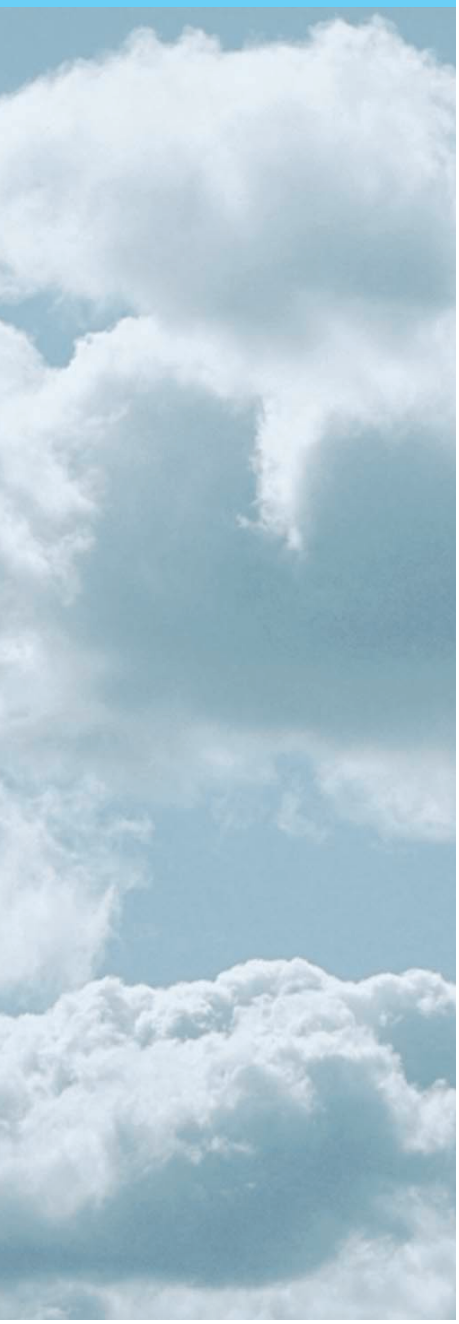
- ***It is recommended that the government investigate the potential for expanding the production and use of bio-diesel, E-diesel and E-85 fuels in Manitoba.***
- ***The panel also recommends that the government examine the increased opportunities for cattle finishing and processing that may result from increased DG production.***

Supporting Ethanol Development in Manitoba

- ***The panel recommends that the existing incentive level be grandparented at Manitoba's only existing ethanol plant only for up to 10 million litres per year until the year 2010 at which time the exemption should be re-evaluated;***
- ***That the Province of Manitoba lobby the federal government to provide incentives for ethanol production that are at least equal to the incentives provided by the U.S. federal government;***



- *That a combined federal/provincial incentive be established at a level which ensures that Manitoba is competitive with its neighbouring juridisctions. The province's portion should be only for ethanol produced and consumed within Manitoba;*
- *That the government continue monitoring the fluctuations in the inputs of the ethanol industry and conduct research to find the most appropriate method of applying incentives;*
- *That once the full mandate has been achieved, the government of Manitoba evaluate the economic benefits of its ethanol program and compare it to the costs, including the foregone fuel tax revenue. Greenhouse gas emission reductions should also be documented;*
- *That 85 per-cent of the gasoline in the province be blended with 10 per-cent ethanol by September 1, 2005. As an intermediate step we recommend that distributors be required to blend ethanol with gasoline, at levels such that ethanol accounts for 5.0 per-cent of total volume, in the period commencing January 1st, 2005 and ending August 31, 2005; and*
- *That the government of Manitoba enter into dialogue with industry and other stakeholders once the 85 per-cent requirement has been achieved to determine whether or not moving to 100 per-cent market penetration would be in the best interest of the province, and other stakeholders.*
- *The panel also recommends that the government immediately establish an Ethanol Office within the newly established Department of Energy, Science and Technology, to be the one-stop-shop that works with communities, and delivers information to the general public and industry on all aspects of ethanol use, and ethanol industry development for the province.*
- *The Ethanol Office be authorized to:*
  - ✔ *examine communications strategies used in other jurisdictions that have developed their ethanol production and consumption industries;*
  - ✔ *co-ordinate all research and development activities associated with expanding the ethanol industry in Manitoba;*
  - ✔ *liase with the federal government, other jurisdictions, and other provincial departments to explore opportunities for joint funding of co-operative communication programs, which will be delivered in Manitoba through the Manitoba Ethanol Office; and*
  - ✔ *develop a strong campaign focused on the economic and environmental impacts of increased ethanol production and consumption. The campaign should include, but not be limited to the development, dissemination and use of materials at schools, in the community, and at industry and potential investor workshops and seminars.*
- *The panel further recommends that this new organization be established and prepared to meet with communities immediately following the release of the government's ethanol policy; and*
- *That the Minister of Energy and Science and Technology, and the Manitoba Ethanol Office specifically, be tasked with working with the government of Saskatchewan, the federal government, and the petroleum refinery industry to develop a specification for the base gasoline to be blended with denatured ethanol to create a gasohol blend that maximizes the benefits of the oxygenate, octane, and other characteristics of 10 per-cent ethanol blends.*



Legislation and Regulations

- ***The panel recommends that the government develop enabling legislation for the creation of renewable transportation fuels, under which mandating of ethanol blends is established.***
- ***The panel also recommends that this legislation should assign ethanol development responsibility to the newly established Department of Energy, Science and Technology, as well as outline the authorities and responsibilities for that department with respect to:***
  - ✔ ***examination of ethanol policies and development of regulations establishing producer and or consumer incentives, their amount, and duration;***
  - ✔ ***undertaking research and demonstration projects in support of Manitoba's ethanol industry;***
  - ✔ ***developing and implementing communication activities related to consumer awareness campaigns related to ethanol; and***
  - ✔ ***establishing regulations under the proposed legislation for the operation of programs or procedures developed to administer the legislation.***
- ***The panel further recommends that the legislation include a duty to report to the legislature on issues related to mandated renewable transportation fuels.***

List of Public Presenters

Hugh Arklie
Mr. Finkle
Dr. Hymie Gesser
Donovan Timmers
Cecil Muldrew - Manitoba Model Forest
Brian Kelly - Kelly & Associates
Greg Bruce - Ducks Unlimited
Larry Macintosh - Manitoba Chambers of Commerce
Fred Kazina - Mayor - Town of Beausejour
Al Tymco - Reeve - RM of Brokenhead
Tony Harmis - TWF Consultants
Walter Keys - TWF Consultants
Daryl Kraft - University of Manitoba
James Rude - University of Manitoba
Bob Lee - Arborg Bi-Frost Community Development Corp.
Leslie Jacobson - Manitoba Rural Adaptation Council
Don Dobson - Southwest Fibre Co-op
Ruth Mealey - Turtle Mountain Development Corp.
Bill Morningstar - Agricultural Producer
Dr. Bill Paton - Microbiologist
Shirley Kalyniuk - West-Central Natural Gas Committee
Don Yanick - Prairie Mountain G7 Regional Development Committee
Ted Wall - Melita and Area Economic Development Corp.
Garth Rutledge - Manitoba Cattle Producers
Peter Hyde - Turtle Mountain Sustainable Ventures
Mr. Aiken - Engineer
John Parker - Cedar Lake Community Futures Corp.
Ken Sigurdson - National Farmers Union
Elaine Gower - Manitoba Agriculture and Food
Ernie Krahn - Mayor - Town of Morden

Thank You

The panel would like to thank the Manitoba government staff for their assistance during our deliberations.

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Grant McVicar - Energy, Science and Technology
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Jim Crone - Energy, Science and Technology
Jeff Kraynyk - Energy, Science and Technology
Henry Nelson - Agriculture and Food
Daryl Domitruk - Agriculture and Food
Dave Bezak - Conservation
Joyce Mueller - Conservation
Jim Potton - Conservation
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Joe Laxdal - Intergovernmental Affairs
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Terry Zdan - Transportation and Government Services
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