SENATE HIGHWAYS
EXHIBIT NO. 1
DATE 2/1/05
BILL NO. SB 293

Montana Department of
ENVIRONMENTAL QUALITY

Brian Schweitzer, Governor

P.O. Box 200901 • Helena, MT 59620-0901 • (406) 444-2544 • www.deq.state.mt.us

January 18, 2005

Dear Montana Legislator:

I am pleased to present you with the following Montana Department of Environmental Quality report on the economic effects of increased ethanol fuel production and use in Montana. The report documents the effects of ethanol use on 1) the gasoline consumer, 2) gasoline refining and retail companies, and 3) local economies and farmers. It also describes the indirect benefits to Montanans from using a more environmentally friendly fuel product.

There are a variety of indications that ethanol fuel use will increase significantly in Montana in the coming years. Yet Montana currently has no ethanol production facilities. Montana gasoline consumers, farmers, and local economies could benefit from developing our potential to produce ethanol from locally grown wheat, barley, and or corn. This report documents those benefits. Hopefully, the report will benefit you as you discuss energy legislation that will affect Montana's future.

Sincerely,

Richard H. Opper
Director

January 5, 2005

Economic Effects of Increased Ethanol Use in Montana

Jeff Blend and Howard Haines, Air, Energy and Pollution Prevention Bureau,
Montana Department of Environmental Quality

The use of ethanol blend fuel is increasing in Western states and in the U.S. as a whole. Reasons for this include federal and state-level incentives, the improved economics of ethanol production, and the increasing number of states enacting restrictions on methyl tertiary butyl ether (MTBE) and other additives that increase gasoline octane. This paper describes possible economic effects of increased use of fuel ethanol in Montana's gasoline markets. The economic effects are described in this paper for four categories: 1. Effects on the gasoline consumer, 2. Effects on gasoline refining and retail operations, 3. Effects of an in-state ethanol production plant on local economies and farmers; and 4. Effects of indirect benefits to Montana from increased ethanol fuel usage.

Current Ethanol and Gasoline Consumption and Production in Montana

Ethanol blended gasoline currently makes up a small percentage of the total gasoline consumed in Montana. The greatest volume of ethanol blend used in Montana is E-8, an 8 percent ethanol blend in regular gasoline, required in Missoula during the winter months to protect air quality. Missoula accounted for approximately 11 million gallons of the almost 18 million gallons of total ethanol blend gasoline sold in Montana in fiscal year (FY) 2003. The most common blend used year-round in Montana is E-10, which is a 10 percent ethanol blend. At the present time, December 2004, E-10 is available at approximately 50 gas stations across Montana. E-85 is a generic term for gasoline blends containing up to 85 percent fuel ethanol. Like gasoline, E-85 comes in a summer and winter blend, with the winter blend containing about 70 percent ethanol to allow the fuel to vaporize in cold conditions. E85 is available to the public at two gas stations in Montana[1]. It is used by private fleets in Gardiner, Montana.

Ethanol is not currently produced in Montana. Ethanol sold in Montana is imported into the state and splash blended with gasoline at distribution bulk terminals. Montana's four refineries provide almost all of the gasoline consumed in Montana. Around 55 percent of the liquid fuel produced at these four refineries is exported[2]. About half of product exports flow south out of Montana to Wyoming, Colorado and beyond. The other half flows to Washington and North Dakota. Gasoline exported from Montana refineries does not contain ethanol. Typically, ethanol is added to gasoline in the destination state that receives it at normal distribution points.

---

[1] "Hydrogen, Wind, Biodiesel, and Ethanol...Alternative Energy Sources to Fuel Montana's Future?", EQC Study Report, Sept. 2004.

[2] "Understanding Energy in Montana", DEQ Report for the EQC, Oct. 2004.

Montana gasoline consumers could potentially be affected by ethanol-blended gasoline if the price they pay at the pump changes[8]. Today, the retail price at the pump in Montana of ethanol-blended gasoline is generally the same as regular unleaded gasoline, even with its higher octane rating than regular grade. Thus, there is currently no direct economic impact on gasoline consumers today who buy ethanol blends. Gas stations compete fiercely on price, and will likely try to keep ethanol competitive with non-ethanol gasoline in the near future. Thus, gas customers should not see more than a few cents per gallon difference in either direction between ethanol and non-ethanol blends in the future. In other words, there should be little economic effect on gasoline customers from the increased penetration of ethanol into Montana's market. In comparison, a separate change in gasoline, the EPA mandate to lower sulfur gasoline in 2006-2007 and again in 2010, will create a 3 to 5 cent per gallon increase at the pump. Also, world oil prices have a far greater affect on gas prices than ethanol, as was seen in 2004.

A federal tax credit helps keep ethanol blend gasoline competitive, because the price of ethanol is currently greater than the price of gasoline. Currently, the rack terminal price for fuel ethanol in the U.S. generally ranges between $1.70 and $1.85 per gallon with most rack prices around $1.80 including Montana's. The rack terminal price varies currently by as much as $0.20 per gallon depending on the location of the terminal[9]. The average retail gasoline price in Montana today, minus about 45 cents per gallon in state and federal taxes, is around $1.45 per gallon. So, there is a difference of 35 cents per gallon comparing straight ethanol to gasoline. The amount of ethanol blended with gasoline, and the tax incentives provided need to be considered for a final comparison. For E-10, a 10% blend of ethanol, the price premium would be 3.5 cents (0.1 times 35 cents). This is offset by a federal tax credit on ethanol of about 4 cents per gallon making e-10 competitive with gasoline for the consumer.

In other parts of the nation, the use of ethanol has lowered the price of gasoline. During the summer of 2004, retail prices for ethanol blend gasoline in the Chicago and Milwaukee areas were less than their non-ethanol counterparts. In Atlanta, ethanol is expected to lead to lower gas prices at the pump in future years. One economist predicts that based on high gasoline prices in 2004, the use of ethanol in reformulated gasoline will reduce the cost of motor fuel and save money for drivers and consumers in the Atlanta metropolitan area by almost 6.5 cents per gallon. The reasons given include the fact that ethanol will increase the supply of reformulated gasoline to the Atlanta area (thereby lowering its price), and the Volumetric Ethanol Tax Credit signed into law by

---

[8] Montana gasoline consumers include just about everyone who drives in Montana or the vast majority of the adult population. Drivers of diesel vehicles are not included. The Clean Air Act Amendments require all cars sold in the US since 1978 to be able to use all legally blended oxygenated fuels, including a 10 percent blend of ethanol. Some off-road vehicles also use gasoline and may be able to use ethanol blend.

[9] Renewable Fuel News, Hart Energy Publishing, December 20, 2005, Vol. XVI, No. 50, page 11.

gallon produced than the other alternatives[13]. Current subsidies on ethanol also played a role in lower costs. In California, ethanol blend gasoline refining costs have been 3 cents per gallon less on average than gas blended with MTBE[14]. It is unclear what the cost comparison would be in Montana, as Montana has already decreased the use of MTBE in its gasoline.

While refinery production costs might be less with ethanol blend gasoline, other costs including distribution could initially be more. With more ethanol consumed, refiners and pipeline terminals would be required to engineer, install and pay for delivery modifications to deliver ethanol, which would entail additional costs. Also, to meet vapor requirements, ethanol-blended gasoline in summer must be formulated with lower evaporative properties than gasoline that is to be sold for direct use[15]. This could add some cost as well. Retailers and distributors would need to change some of their procedures and educate their employees on how to handle the ethanol blend. Also, with greater market penetration, ethanol would be transported by rail car and tanker trucks to bulk terminals, which could cost more than using the pipelines which transport a majority of gasoline in Montana today. However, these costs do not appear to be prohibitive to the gasoline industry in other states. California, for example, banned MTBE in January 2004, and has been using ethanol ever since without supply disruptions or increases in cost greater than their other "boutique" fuel requirements (e.g. the recapture of refueling vapors, low benzene, etc.).

There could be another cost to Montana refiners from increased ethanol blend displacing in-state demand for the gasoline refined in Montana. Using the ethanol consumption estimates made in the previous section, up to five percent of Montana's total refined gasoline would be displaced with ethanol. The five percent displacement number assumes that 100 percent of Montana gasoline in the future contains a 10 percent blend of ethanol, with the additional understanding that less than half of what refineries produce is consumed in-state. By increasing their gasoline exports, refineries would likely make up that five percent or less displacement without much problem.

It appears that the costs to Montana's petroleum industry, including refineries and distributors, would not be any more prohibitive than those associated with meeting other standards that have occurred in past years. Past regulatory costs have been significant in the short-run to Montana's gasoline industry, but have not significantly hurt any of Montana's currently operating refineries.

Longer-term costs, if any, would likely be absorbed by refineries, or passed on to consumers in slightly higher gas prices. Refineries have had to absorb

---

[13] "Replacing the Volume & Octane Loss of Removing MTBE from Reformulated Gasoline: Ethanol Versus All Hydrocarbon RFG" prepared by Downstream Alternative. The RFA study was found in The Clean Fuels and Electric Vehicles Report, Energy Futures Inc., Vol 16, No. 3, September 2004.
[14] California Ethanol Workshop, presentation by California Air Resource Board, April 2003
[15] Montana Petroleum Association State Level Ethanol Mandate White Paper (October, 2004).

Today, there are no ethanol plants in Montana. A number of smaller plants operated from 1980-1995. The first ethanol plant began in Ringling in 1980. That same plant ended all Montana ethanol production in 1995. All were small operations, were underfinanced or had inexperienced management. Fuel ethanol production technology has greatly improved since then and operations are successful in many small rural states. All proposed ethanol plants in Montana are sufficiently large to capture economies of scale. The greatest annual ethanol production in Montana was 4.95 million gallons in 1985 from five plants[18]. Today's proposed facilities would produce that much in a month.

Currently, there are several ethanol production plants proposed for locations in Montana. Two plants are on the 2-year Montana Department of Transportation short list for the Montana production incentives described above. One would be in Hardin and another in Great Falls. The keys to success for an ethanol plant in Montana include sufficient financing, sufficient grain inputs, effective management, strategic partners, affordable transportation of the ethanol to markets, and sufficient markets for plant co-products. There are two state level incentives that encourage ethanol production in Montana. One involves a reduction in the state motor fuels tax collected on ethanol blends at specially marked pumps and the other involves a 30-cent per gallon incentive to the ethanol producer using Montana agricultural products. Both incentives are subject to numerous limitations and restrictions[19].

Using economic figures from available ethanol case studies, a 50 MGY ethanol plant in Montana would create an estimated 40-50 permanent jobs, $3 million in annual additional income, $1 million in additional annual tax revenues and a one-time boost of up to $140 million to the local economy during plant construction[20]. These are conservative, low-end figures and do not include positive secondary effects from such a plant, including increased local business and local equipment purchases by the plant. All of the case studies viewed suggest that the jobs in such a plant would be high paying compared with the average Montana job, and that such a plant would buy some of its needed inputs locally. If a larger plant or more than one such plant was built in Montana, then these benefit numbers would increase accordingly.

Several companies have completed or are currently working on wheat-feedstock projects in Canada where the economics are somewhat better for wheat plants than in the U.S. For example, two smaller wheat gluten/ethanol/meat packing operations have come on-line in Canada in the past decade using older, less

---

[18] Montana Department of Revenue records of distributor and producer incentives paid.

[19] "Hydrogen, Wind, Biodiesel, and Ethanol: Alternative Energy Sources to Fuel Montana's Future?", EQC Study Report, Sept., 2004, page 44.

[20] Ethanol studies researched include, "Economic Impact of Ethanol Production Facilities" by ENERGETICS and the NEOS Corporation (June 1994), "Fuel Ethanol-A Technological Evolution", by NOVOZYMES and Brian and Brian International, (June 2004) and "Ethanol and the Local Community", by John Urbanchuk of AUS Consultants and Jeff Kapell of the SJH & Company, (June 20, 2002).

greatly contributed to the growth of the ethanol industry. Currently, corn prices are about $1.90 per bushel while feed barley is $2.50 and wheat is $3.00[24]. Barley and wheat crops are more common in Montana than corn. Such production would potentially increase the demand for local agricultural products and possibly raise crop prices, which could increase farmer's net income. For example, Montana farmers typically do not sell wheat in Washington State markets because of competition with local wheat crops, but the Puget Sound area might purchase millions of gallons of Montana-produced ethanol.

Increased ethanol production in-state could slightly shift the mix of crops on all Montana agricultural land towards corn, wheat and barley, if the markets for producing those crops for ethanol were great enough. Off-specification grain that is currently going to feed markets could be used instead for ethanol production. Off-specification grain often has a low amount of protein compared to premium grain which suits ethanol production well because low-protein means grain with higher levels of starch. Enough off-specification grain is produced each year in Montana (1 to 3 percent of Montana's total crop) to supply at least a 50 MGY ethanol plant if transportation costs were favorable. In 1985, Montana's lowest crop yield in 75 years, 1.5 percent of the total wheat crop would have produced about 56 million gallons of ethanol[25]. That does not mean that all distressed grain would go to ethanol production. The distillers grains that do go to ethanol production could still be used for animal feed after being processed for ethanol, thereby reducing or avoiding cost impacts in stock growers.

Next year's changes in the Conservation Reserve Program (CRP) could cause changes to be made with land use in Montana. Two million acres will be retired from the program in the next 3 years. This land may be put back into the CRP, but some of that land may go back into crop production. This change could be very compatible with an ethanol plant(s) operating in Montana, as more land might be available for growing the needed plant feedstock without displacing as much Montana-grown grain that is already committed to other markets.

The extent to which a Montana ethanol plant would raise crop prices statewide, if any, is unknown, although price increases in local regions of other states have been documented[26]. The greatest benefit to farmers selling their product to a Montana ethanol plant may be a decrease in the rail freight charges they have to pay. The charges to ship grain out of state are substantial, and any savings from not having to do so could accrue to farmers. In addition, ethanol plants can use distressed, low-quality (low protein) grain, thus providing markets for a product that would otherwise command a low feed price.

---

[24] Brent Poppe, Montana Department of Agriculture, personal communication.
[25] "Energy From Montana Crops and Residues", Montana Department of Natural Resources and Conservation, 1987.
[26] Nebraska Ethanol Commission, 2002.

- Ethanol is biodegradable. Using ethanol as a gasoline oxygenate rather than MTBE could reduce or stop the water contamination and associated remediation costs in Montana that can occur from MTBE.
- Ethanol blend gasoline produces lower emissions of carbon monoxide, unburned hydrocarbons, volatile organic compounds, and fine particulate exhaust products of conventional fuels[29].
- Ethanol can increase the U.S. domestic energy supply. It takes only 1 gallon of petroleum gasoline equivalent energy to produce 1.67 gallons of ethanol using today's technology[30].
- Producing ethanol fuel in the United States better ensures energy security, reduces the U.S. trade deficit, and reduces the need for securing Middle East oil.
- Increased air quality from cleaner burning fuel with ethanol provides the benefits of better air visibility, healthier ecosystems, and higher quality recreation.
- Ethanol may use materials that would typically go into the waste stream, thus reducing waste to make a valuable product. For example, ethanol production could assist in the disposal of paper mill waste sludge.
- Ethanol speeds up the gradual U.S. switch away from a fossil fuel economy by resulting in the use of less hydrocarbons from non-renewable resources. Using ethanol in all reformulated gasoline nationwide could contribute 1.6 billion gallons per year to the U.S. fuel supply[31].

Conclusion

The greater penetration of ethanol blend into Montana's gasoline market would produce insignificant benefits and costs on a state level in terms of major economic indicators. Benefits would be significant on a local level to select communities and farmers if an ethanol plant were built in Montana. These local benefits would include jobs, income, local tax revenue, secondary economic effects, and possibly higher prices to select farmers. The initial costs to the petroleum industry of switching to ethanol blend could be noticeable, although long-term industry costs would not be significant. The experience in other states shows that the long-term costs of switching to ethanol blend are eventually absorbed by the industry and are a part of the costs of doing business in a changing world. Gasoline consumers would experience no significant effects, and could see either a small rise or small fall in the gasoline prices they pay. There would be a benefit to the environment in the form of both improved air and water quality, and to Montanans that enjoy the environment.

---

[29] Argonne National Laboratory, GREET Model 1.6, 2003.

[30] This figure is from the USDA, June 2004, as reported in "Net Energy Balance of Ethanol Production", Fall 2004, A Publication of Ethanol Across America, page 6.

[31] The Clean Fuels and Electric Vehicles Report, Energy Futures Inc., Vol. 16, No. 3, September 2004.