

An Alternative to Gasoline: In Search of the Best Transportation Biofuel for Minnesota

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Introduction

Gasoline reserves are going to run out, most likely sooner rather than later. And as that day approaches, it's becoming increasingly important for us to find another way to fuel our cars. Not only do we have limited amounts of gasoline but it also has many negative effects on the environment, such as its contribution to global climate change. Because of all of these issues with gasoline, I believe that we need to be looking at more sustainable alternative fuels, specifically biofuels. There is no question that cars are responsible for much of the air pollution currently released, so finding and implementing a cleaner fuel has the potential to greatly reduce our impact on the environment. **My goal is to find the best biofuel for Minnesota. The ideal biofuel would be grown in Minnesota or in the surrounding region to minimize transportation, be cost-competitive to grow and refine, and be environmentally friendly.**

Criteria for a Good Biofuel

I judged each of the potential biofuels with the same criteria:

- Economic Feasibility
- Environmental Pros and Cons
- Efficiency
- Impact on Food Supply
- Impact on Soil Quality
- Ability to be grown and produced in Minnesota or the surrounding region

Problems with Current Biofuels

Corn Ethanol & Soy Biodiesel

Right now in the U.S. the only biofuels we are heavily investing in are soybean biodiesel and corn ethanol. On the surface, corn ethanol would appear to be the better option of the two for Minnesota. It could be grown in-state or brought in from nearby Iowa, and government subsidies make it cost-competitive. However, a study by the University of Minnesota found that "both [corn ethanol and soy biodiesel] require significant energy to produce, have their own environmental impacts, and could divert corn and soybeans from the nation's food supply." And neither can completely match our current fuel need. Therefore, while both are improvements over petroleum products, neither should be relied on as a long-term solution.

Potential Biofuels

Corn Stover

Ethanol from corn stover would be a fairly good option for Minnesota. It is economically feasible, it can be easily implemented, and it is not a food crop (although it is the byproduct of a food crop). However, because corn is not very sustainable to grow, with high inputs of fertilizers and pesticides which decrease soil quality, it is not the perfect solution. I believe that there are still better options for Minnesota than corn stover ethanol.



<http://www.rechargenews.com/energy/biofuels/article136479.aspx>

Switchgrass

Switchgrass ethanol is a very promising biofuel option for Minnesota. It is native to the area, is a non-food crop, requires little or no fertilizers or pesticides, is carbon-negative, and sequesters carbon. Really, the only question is economic feasibility; if we can get funding (mainly to build new production facilities), then it should be possible to transition to switchgrass ethanol for our transportation fuel needs.



<http://allyreves.wordpress.com/2008/03/>

Miscanthus

Miscanthus ethanol is also very promising. Like switchgrass it is able to be grown in Minnesota, is a non-food crop, requires little or no fertilizer input, is carbon negative, and sequesters carbon. The problem is that miscanthus seeds have only been commercially available in the US for three years, so little is known about its full potential as a fuel. Further research and development of miscanthus is necessary for it to become economically viable as a biofuel in Minnesota.



http://www.aces.uic.edu/news/news_photos/miscanthus2/pages/miscanthus2.html

Comparison of the Five Biofuels

	Gallons of Fuel/Ha	Crop Yields (tons/ha)	Net Energy Gain	Reduction in GHG Emissions	Production Costs/Gallon
Soy Biodiesel	242	2-4	93%	41%	\$2.67
Corn	1000	8-9	25%	12%	\$2.12
Corn Stover	600	3-7	45%	90%	\$2.62
Switchgrass	600	5-7	50-57%	90%	\$4.53*
Miscanthus	2100	17-25	60-85%	90%	\$2.74
Petroleum	-	-	-	-	\$0.95

*Should be down to around \$2.75 by the end of 2011.

Conclusion

Switchgrass and miscanthus are more promising biofuel options for Minnesota than corn stover. Both plants can be successfully grown in Minnesota, both are sustainable and environmentally friendly, and neither are food crops. However, switchgrass is the better option for Minnesota at this time. Too little is known about miscanthus, so further research and development is necessary for it to become a viable biofuel option for Minnesota. Miscanthus has by far the biggest upside; it could surpass switchgrass as the best option with more development. I believe I have found the answer to our transportation fuel needs, now and in the future, in switchgrass and miscanthus ethanol.