

Non-Food Sugar beet Feedstock to Advanced Biofuels



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NDSU BioEPIC

Green Vision Group

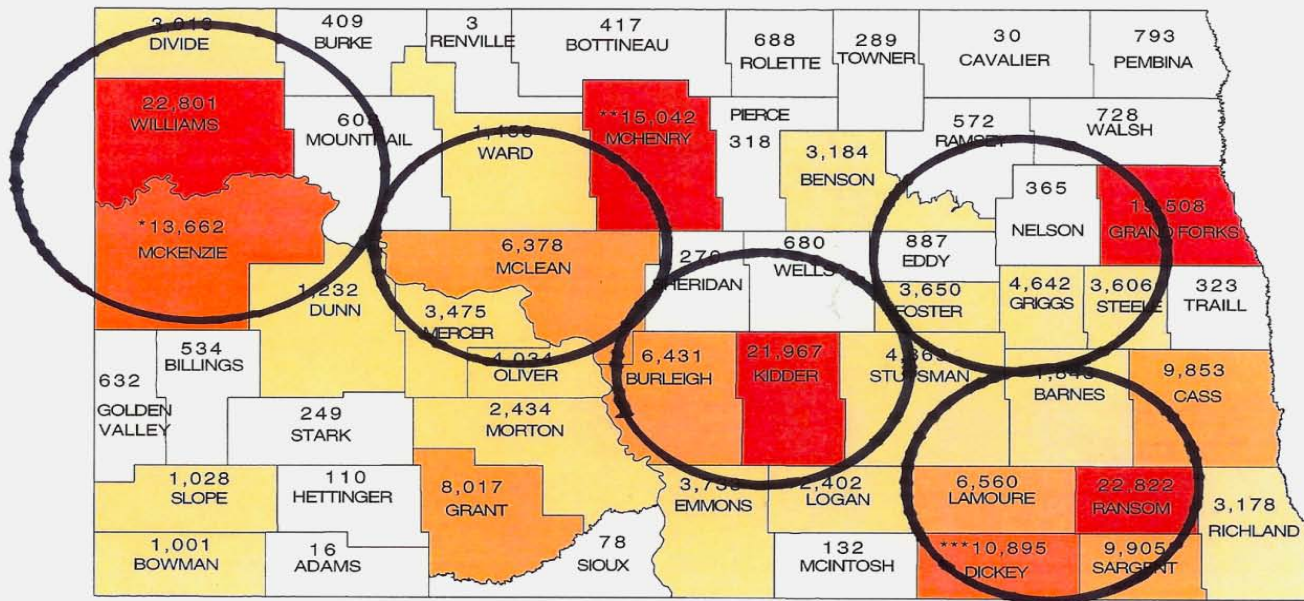
Heartland Renewable Energy

*Project Funding - North Dakota Agricultural
Products Utilization Commission*

Project Goal

- Develop sugarbeet to biofuel industry across ND with five irrigated production regions
- Provide local economic opportunity

Potential Sugarbeet Biofuel Feedstock Grow-out Locations



Sugarbeet Advanced Biofuel

- Sugar to ethanol is a simple, direct and economical process proven throughout the world
- When compared to grain crops, sugarbeets can yield up to double the ethanol/acre
- Growing sugarbeet feedstock can reduce nitrogen requirements, water use and reduces CO₂ emissions
- Uniquely meets Energy Independence Security Act objectives

2007 Energy Independence and Security Act

Year	Conventional Biofuel	Advanced Biofuel	Cellulosic Biofuel	Biomass-based Diesel
2008	9.0			
2009	10.5	0.60		0.5
2010	12.0	0.95	0.10	0.7
2011	12.6	1.35	0.25	0.8
2012	13.2	2.00	0.50	1.0
2013	13.8	2.75	1.00	*
2014	14.4	3.75	1.75	*
2015-2022	15.0	5.50-21.0	3.00-16.0	*

Biofuel Categories

- Conventional biofuel – 20% GHG reduction
- Advanced biofuel – 50% GHG reduction
- Cellulosic – 60% GHG reduction

Patented Energy Saving Process

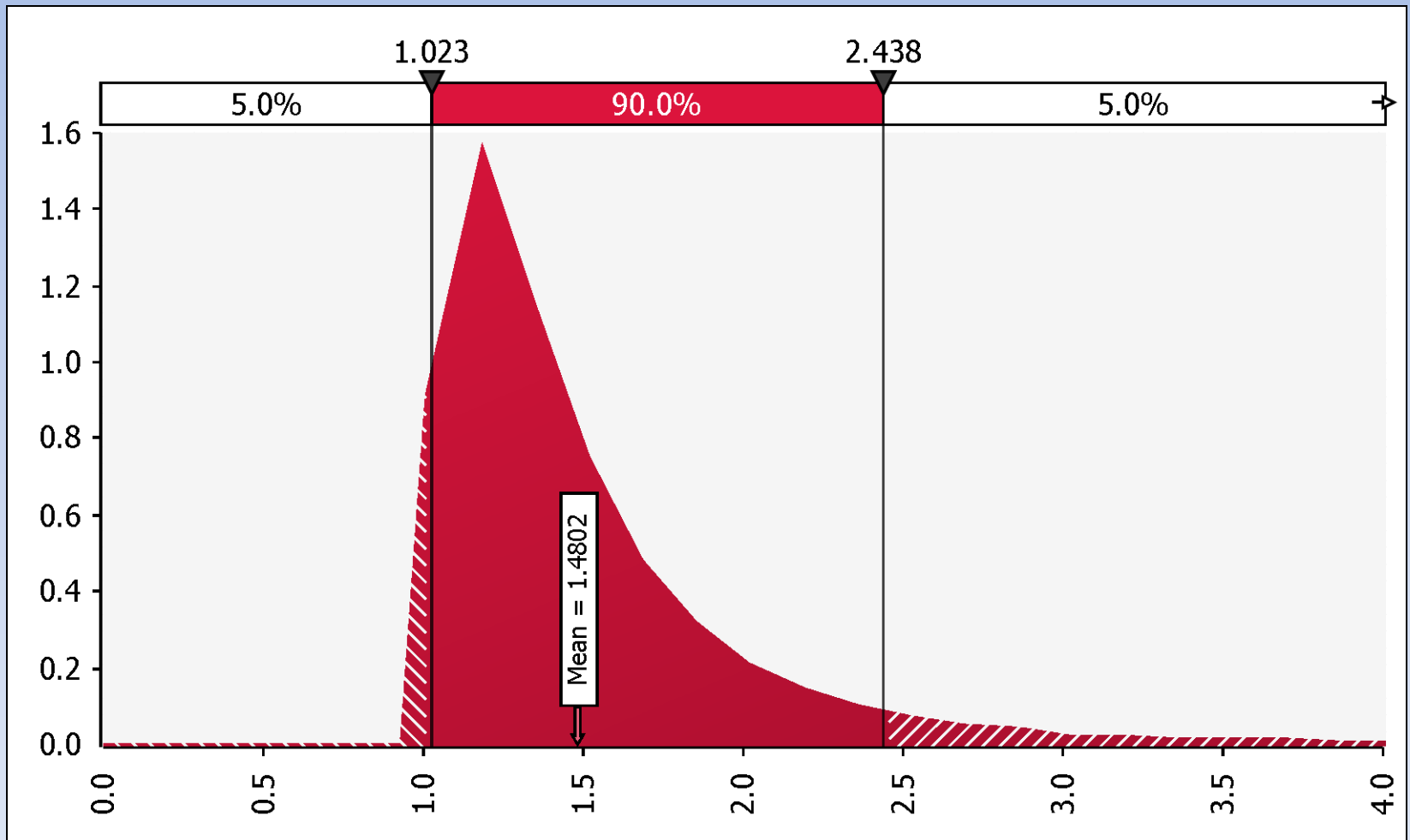
- Processing plant would internally produce 70-75% of the plants energy needs.
- Stillage waste from fermentation process is spray-dried and burned to produce plant heat.
- Dried product burns at higher BTU output then traditional processing plant fuel.
- Patent has been successfully laboratory tested and now needs commercial scale test .

ND APUC Grant

Economic Feasibility Study

- 20 mgy plant
- 26.5 gal./ton
- 75% of plant thermal needs from spray-dried yeast
- Yeast, livestock feed, and potash fertilizer are key co-products
- Break even cost was \$1.48/gal. ethanol with feedstock priced at \$42/ton and ethanol price of \$1.71/gal.

Break-Even Risk Analysis



Project Time-Line

- 2009 - Initial economic feasibility
 - Irrigated yield trials-Oakes and Carrington
- 2010 - Expanded yield trials
 - Conduct lifecycle analysis of system
 - Develop capital & ownership plan
 - Secure supplier and marketing agreements.
- 2011 - Construct demonstration plant
- 2012 - Build biofuel non-food sugar beet processing plant

Questions?

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