Contract No R-009-020
Dakota Spirit AgEnergy Status Report
March 1, 2011

Executive Summary

A formal "Feedstock Supply and Product Marketing Study", factored estimate of capital cost and internal financial models have been completed since the NDIC Grant award was made. We now have independent verification of the product market values and the delivered cost of biomass based on our original assumptions. We also have an independently derived factored estimate of capital cost. This data has been incorporated in our internal financial models and we have pro forma financials for a 20 MGPY cellulosic biomass refinery in North Dakota.

Our analysis and models show that in order to be economically feasible, a smaller scale plant will be the preferred and most probable path for success (See Appendix A for Confidential detail). Higher than expected capital investment and feedstock costs are the two main drivers in a plant concept that is not financeable at 20 MPGY. By reducing the scale of the plant to 8 MGPY, the delivered cost of feedstock is reduced, due to decreased collection and transportation costs coupled with higher residue productivity closer to the plant location. Capital cost is also reduced in total and further improvements can be achieved by creating a phased in hybrid plant approach to leverage mature balance of plant infrastructure with larger overall economies of scale.

Phase I – 50 MGPY	Phase II – 8 MGPY	Phase I + II - 58 MGPY
Conventional dry mill ethanol plant "backbone"	Cellulosic "bolt on" front end	Hybrid biorefinery plant
Provides foundation of positive cash flow for overall project finance	Incremental investment in smaller scale specialized core technology has lower CAPEX and OPEX	Winning combination of new & existing technology

Our preliminary financial analysis of this hybrid approach shows significant promise. We will initiate Competitive Analysis and Grain Report Studies of Phase I to establish independent verification for our new Phased Hybrid approach.

Our original schedule remains unchanged.

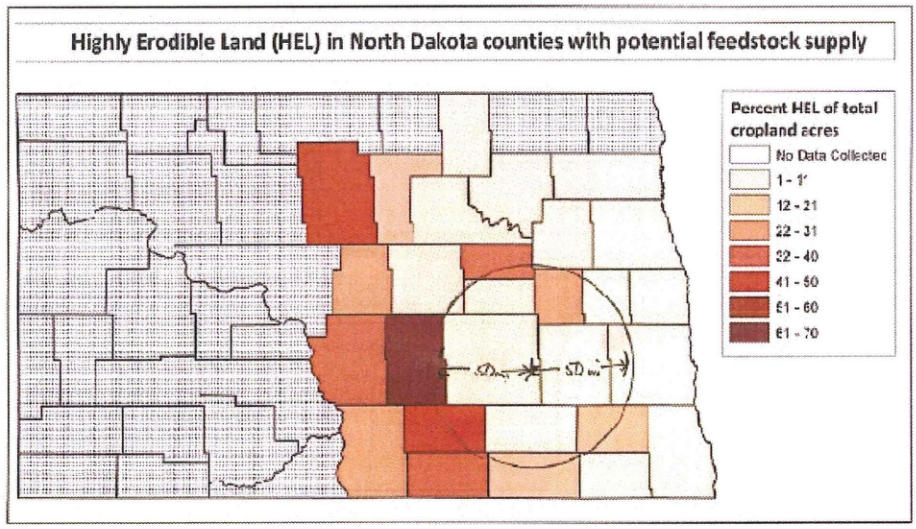
Feedstock Supply and Product Market Study

The delivered cost of feedstock was derived independently by North Dakota State University and PowerStock. Industry sources and literature generally forecast a range of delivered costs on the order of $45 to $50 per bone dry ton, which formed the basis of our initial projections. Taking a detailed look at the specific availability and logistics revealed a different picture with significant dependence on the productivity of crop residue removal suitable for the area.

Delivered Feedstock at Cost	Source	Wheat Straw		Corn Stover
Removal Rate (Tons per acre)	NDSU	0.5	1.0	1.0
Collection & Harvest $/Bone Dry Ton (BDT)	PowerStock	$42	$22	$22
Transportation to Storage $/BDT	PowerStock	$17	$14	$14
Storage & Delivery $/BDT	PowerStock	$12	$12	$12
Nutrient Replacement Value $/BDT	NDSU	$10	$10	$15
TOTAL DELIVERED COST		$81	$58	$63

A key driver of sustainable crop residue removal is the prevalence of "Highly Erodible Land" which could trigger a conservation plan that could limit the amount of residue available for removal. This created a snowball effect, if we reduce the amount of residue available per acre, the productivity of equipment and labor drops, increasing costs at the same time we drive a larger collection radius, driving transportation costs higher. The net impact is to increase delivered costs by $20 per ton.

Additional research is required to better quantify the prevalence of "Highly Erodible Land" in the area surrounding Spiritwood. From NASS data, it appears as though "HEL" is more prevalent in the western part of the State and that Stutsman and Barnes counties have very small percentages of land affected.



Higher than expected capital and feedstock costs led us to the conclusion that if we could minimize the total volume of crop residue required by scaling down the plant, we could draw from a smaller transportation radius that would actually improve the delivered cost of crop residues from higher productivity and reduced transportation costs. A smaller plant has a higher probability of financial success.

The value of product streams including C5 molasses for animal feed and other chemical feedstock markets was provided by TSS Consultants, and reconciled well with early projections. Testing and analysis will be required to verify the final quality and pricing of molasses, but we feel confident that with multiple markets and applications, we will be able to achieve our financial forecasts for the value of molasses.

TSS Consultants Product Market Values	Market Value
Ethanol	$2.00/gallon
C-RIN	$1.00/gallon
C5 molasses	$95 to $130/ton
Lignin	$50 to $150/ton

Dakota Spirit AgEnergy Hybrid Phased Approach required for success

The strategy for success now is to create a phased in "hybrid" biorefinery to leverage the mature economics of a 50 MGPY conventional dry mill ethanol plant (backbone) while establishing a solid foundation of positive cash flow for the full development. Raising the E10 Blend Wall to E15 has created a brief window of opportunity for a conventional facility using combined heat and power and corn oil extraction to achieve a D-RIN qualification. The mature technology allows us to build out the entire balance of plant at the most economical rates, and provides a significant jump start in the development and construction process. By phasing a conventional facility with a scaled down "bolt on" cellulosic front end, we also reduce the total installed cost to our original plan. An 8 MGPY cellulosic front end is still considered "commercial scale" and reduces the feedstock requirements to about 192,000 tons per year – which would be available within a much more economic draw radius.

GRE Investments (See Appendix B and C for attachments)

INVESTMENTS TO DATE:	
Inbicon Pre-FEED PDA (Appendix B)	$218,121.51
UPCOMING DEVELOPMENT EXPENSES:	
Competitive Analysis and Grain Report for Phase I (Appendix C)	$50,000
Fagen Phase I Engineering (estimated)	$100,000
Fagen/Inbicon Phase II FEED (estimated)	$300,000
Site permitting (estimated)	$150,000