March 1, 2010

Introductory Statement

On February 5, 2009 Green Vision Group, Inc.(GVG) met with Heartland Renewable Energy, Inc.(HRE) who had completed a Economic Feasibility Study (EFS), built a small pilot plant to process molasses ethanol and were planning to do a commercial size burn test of their patented spray dried waste material from the fermentation process. Their group ran out of funding and were unable to complete the burn test. Syngenta seeds had completed two half-acre sugar beet trials, and through our contact with Syngenta, they recommended HRE contact GVG as we had experience developing major agricultural high value crop processing projects. HRE had completed the modular design of a 20MGY processing plant and brought the biofuels processing technology to our project that we were lacking. Following our meeting, we agreed to a letter of intent to form a partnership company.

The energy beet integrated biofuel project was initially funded through an APUC grant on Feb. 21, 2009 that was organized by NDSU. NDSU has been a full collaborator throughout the project providing research support when called upon. The original purpose of the APUC funding was to do the Economic Feasibility Study (EFS), however, since collaborating with HRE, we only needed an addendum to the BBI International EFS. NDSU applied North Dakota agronomics and pricing to the BBI study to complete the study for North Dakota. The studies were both very positive. In addition to the EFS, the APUC grant was also to develop an integrated plan and formulate the four objectives identified in the RFC grant application. Those objectives were aligned to build strength to the overall project in developing a premium advanced biofuel that would command a marketplace under EISA 2007.

The first objective was to prove a successful commercial burn test . The results of the test are necessary for the design of the processing plant. The test is also needed to build grower and investor interest. A successful test will reduce the total processing by ten percent (10%). (See page 16 & 17 of appendices “A”) We also hope to generate environmental credits by significantly reducing the carbon footprint with energy beet feedstock.

The second objective was to place demonstration and yield trials at five locations throughout North Dakota to prove to growers that energy beets can be grown, both dryland and irrigated in many areas of North Dakota. A second part of the objective was to develop yield data of varieties genetically bred for energy and report yield data to the USDA Billings Field Office for the Federal Crop Insurance program. Loss coverage for food “sugar” sugar beets would be very different from for industrial “energy” sugar beets. Energy beet breeding programs will be for yield and sugar content without regard to sugar crystal quality or level of impurities. Energy beets can not be used to produce sugar, but sugar beets can be used as an energy feedstock for ethanol.

The third objective was to research the beet juice shelf life as the juicing and fermentation process could be designed as two separate operations. Stabilizing the juice shelf life would

allow for greater flexibility of feedstock material, region of production and would increase utilization of the processing plant. The longer-term benefit would be to establish off site juicing facilities, which would expand the grow-out area, and juice could be transported to the fermentation and distillation plants via pipeline. There would be less volume to transport, less local road maintenance and a reduced transportation expense.

The fourth objective provides for producer and community education programs for the five regions to gain their support and bring them in as project partners. In addition, we plan to begin the search for U.S. and foreign investors. We have plans to meet with investors in Germany and France as two members of GVG & HRE will be making the tour of beet ethanol plants this year in those two countries as guests of Beta Seeds.

Objectivity:

Related question or statement by 2A & 2B: Project approach is too fragmented and appear to be separate projects loosely interrelated.

Answer: The objective introductory statement should answer these questions.
For clarity purposes, we hope you can see the four objectives are not disconnected, but very well integrated in developing a solid base for the project. GVG, HRE and NDSU are all working collaboratively and using internal resources to jointly address the multitude of questions being raised as the project progresses. Recent examples of internal studies include formation of energy beet production costs, machinery compliments , BCAP analysis, development of the Griggs/Steele grower base, etc. The four tasks we are requesting external funding for in this grant are beyond our internal capacity. We believe reviewer 2C fully understood the value of this project and was able to connect the objectives more clearly than 2A or 2B.

Question or statement by 2B: Project does not involve tapping into a new source of energy for North Dakotans. Project would require the use of valuable farmland and replacement of food producing crops. Beets as feedstock are in the early stage of research and development and would not provide many new jobs for North Dakota.

Answer:
Under the 2007 US Renewable Fuel Standard, sugar beets and sugar cane are classified as advanced biofuel feedstock with 50% or more reductions in green house gas (GHG). We believe energy beets will command a premium in the marketplace under EISA 2007. This would be a new, cleaner energy source for North Dakota.
Energy beets require only 50% of the land required for corn ethanol as one acre of irrigated energy beets produces nearly 1,000 gal. of ethanol. One acre of irrigated corn produces about 450 gal. of ethanol. We do not know what the cellulosic ethanol yield/acre will be at this time as it is in early stage development. The soil benefits from the introduction of energy beets into crop rotations may offset the limited number of acres dedicated to the crop (appendices “C”). Energy beets are new to the US, but they are the number one feedstock for ethanol in Europe (Appendices B). The beet ethanol plants would employ about 30 people and there would be

substantial employment at the farm level as well. This is a very rural project, and new employment opportunities will create a greater impact on our rural communities than urban areas.
1, 2C We feel this reviewer fully comprehends the significance and potential of the project.

Achievability:

Question by 2A: How will objectives advance the beet fuel industry in ND?

Answer:
Through the education and promotional programs, we will secure a solid grower base and processing plant investors. After one year, the project would have a proven production and processing experience to draw on for the second grow-out location and processing plant. The plant design is a modular design and can be easily replicated in another area. We would repeat the same integrated process successfully completed for development of plant one.

Question & statement by2B: Will the trials be successful ?

Answer:
Yield trials are a critical aspect of the project. They are needed to alleviate producer production concerns, establish crop yield histories to obtain Federal Crop Insurance policy coverage, and document optimal application of nitrogen and other energy inputs that are critical in obtaining EPA certification of the energy beet pathway to advanced fuels. Advanced fuels will command a premium in the marketplace. The reviewer fails to understand that research trials from other states are of marginal value to ND farmers. We are the lowest cost producer of sugar beets nationally. Therefore, studies from other states would show less economic opportunity and our current sugar industry would not have gotten off the ground. We have historical yields at Oakes and just obtained first year, 2009 yield results from the Carrington Research Center (appendices "D") Growers will be fully informed if the crop is riskier than competing enterprises. With respect to storage, the goal of the study is to extend juice quality enabling a longer processing season. This will be clarified in submission of detailed research protocol if desired.

Question 2C: What are the waste materials and how do you dispose them?

Answer:
The current corn ethanol processing plant treatment of waste stillage from the distillation process is treated in a waste water treatment facility with anaerobic digesters (which creates methane gas), then aeration basins, clarifiers and then the effluent is placed back into the natural water system. This also creates a solid waste that must be dealt with in waste dump piles.
Our patent takes the stillage, spray dies it into powder that can be directly burned in a boiler. The exhaust from this boiler is used in the spray drying process and throughout the entire

ethanol plant process. From laboratory tests that produced this powder and a proxy performed by SDK labs, the powder contains 5600 btu's per pound. We estimate that 480,000 million btu's can be generated per year from stillage of a 20 MGY ethanol plant and the resulting energy will provide 75% of the thermal energy requirement of the processing plant. The waste material after the burn will be sold as potash. There remains non-contact blow down and condensed water (about 2.3 gpm) and can be used for irrigation or placed back in the ground water system. We estimate less than 2 gal/minute of actual waste water will need to be treated.
The burn test is required to determine the optimum type and material construction of the boiler for this process and to verify the results of our lab tests. Stanley Consultants will evaluate the results of the burn test using conventional boilers, biomass boilers and also examine possible gasification, certify the results and recommend the best solution.

Reviewer 2C also recognizes that the quality team of University and Industry researchers, engineers and scientists haves the capabilities and experiences to carry out the proposed tasks.

Methodology:

Related question from all reviewers : Methodology is sketchy , more contractor details needed for principal investigator.

Answer:
Biofuels stored under different technologies are a central component of this study . Due to page limitation of the grant proposal, we were unable to submit our complete research protocols. If the project is funded, we are agreeable to adding a condition that a full research protocol be provided to REC for approval prior to project initiation.
The identification and efficient use of waste materials from the ethanol process is described in the answer to reviewer's question 2C on page 3. Additional clarification can be obtained at the presentation of the project, as our technical partners will be attending the meeting.

Contribution:

Question 2A: Did not understand the value of the burn test to the overall plant design and economic benefit. Other three objectives may contribute a little, but not add significantly to science and technology.

Answer:
The ability of the project to use waste streams directly increases plant profitability (10% of the ethanol processing plant's total expense). Indirectly, a positive burn test will lower GHG and increase chances of qualifying as EPA cellulosic biofuels (60% GHG emission reduction). Both aspects strengthen investor appeal and grower confidence.

While not basic science, significant infrastructure is needed for industry development including creation of a grower supply chain. This applied research proposed is critical to developing that aspect.

Conflict in views of 2A and2B:
Reviewer 2A thinks an investor would rely less on technology data in making their investment decisions but thinks the hurdle might be in business and policy, not so much technology. Whereas reviewer 2B believes research is key before farmers and biorefinery operators will gain interest. We believe reviewer 2C understands the full project and the need for all study components.

Awareness (5) & Background (6):

Question (5) 2B: Proposal does not provide advantages and disadvantages of sugar beets relative to corn or other cellulosic –based bioethanol feedstock.

Answer:
Refer to 2B answer on page 2. The use of corn feedstock is limited to 15 billion gallons per year(BGY) ethanol under the 2007 Renewable Fuels Standard. Advanced and Cellulosic classified feedstock have a mandated goal of 21 (BGY) of biofuels by 2022. The advantage of corn ethanol is it is an already established biofuel industry. The disadvantage is it has greater GHG emission than either energy beets or cellulosic feedstock. The capital investment in processing plants is about equal at $2.15 per gal. The cost of production is about the same at $1.57 assuming a successful commercial burn test of the waste material derived from the energy beet process. GHG of advance and cellulosic biofuels (50% and 60% respectively) are at lest half of corn grain ethanol (20%) according to EPA's Feb. 3, 2010 regulation.

Question (5) 2C, (6) 2B: Principal investigators show no published literature.
The reviewer is correct, there are many research voids we noted in our written proposal. This study attempts to resolve some of them. In particular, we want to obtain energy and mass balance information from burn test data, nitrogen and other crop input, storage and logistic infrastructure that bear on EPA's determination of lifecycle pathway.
The research side of industry is week . We originally planned to have Dr. Cole Gustafson, NDSU be the lead investigator, however when the proposed REC application was presented to the NDSU Sponsored Programs they said an administrative indirect fee for the project would be necessary in the amount of 43.6% of the total grant. This would have bankrupted and gutted the core funding for our needed research. This is a public spirited rural development project , developing a new industrial crop and ethanol processing throughout the state of North Dakota. Assessing the high level of administrative fees limits research. We believe more of the state match funded grants should be directed to research rather than university administrative expenses. As President of GVG, I assumed the role of lead investigator in order to save the corpus of the match fund necessary to complete the needed research of this important project. The project researchers have an extensive record of research excellence and are viewed as

national leaders in their profession and I have confidence they will carry out the tasks of the research. In its recommendation, the Council is welcome to request full vitas if they have any question. One subcontractor is EERC, also national regarded. A very positive aspect of this study is the cooperation between NDSU and UND.

Equipment Purchases:

Reviewer 2C scored this item 0 which we believe was unintended as it doesn't apply. Consequently our overall score is lower.

Overall Comments and Recommendations:

We are aware of the Jacob's 2006 study and USDA's earlier study on utilizing sugar for ethanol feedstock. The study is more than 5 years old and technology has changed greatly since then. For example, the USDA sugar beet feedstock cost at that time was reported at $2.35, whereby our 20 MGY model plant projects a feedstock cost of $1.45. These studies were completed prior to the US Renewable Fuels Standard and the 2007 Energy Independency & Security Act, which provides more revenue and national support for advanced biofuels. Contrary to the reviewers view, even Jacobs acknowledges that more basic research is not needed as large scale production already exists in Europe and Brazil.

We commend reviewer 2C for recognizing the integrated nature of the four project objectives. For example, results of the juice storage study bear directly on processing plant size, location, and break-even cost. Extended storage of beet juice lowers plant fixed cost because the assets are more fully utilized year round. Seasonality of plant use bears directly on our efforts to develop other feedstock sources, such as sweet sorghum, which may partially fill seasonal energy beet voids.

Because of the timing of the grant proposal presentation to the REC April 7, 2010, we started introducing the project to the target area of Griggs and Steele Counties on Feb. 1, 2010. We believe most producers will be preparing to go or be in the field planting in early April, and it would be difficult to present the project to them at that busy time. We have had good reception from the two county area leaders and will begin March 1, 2010 developing a local support group in identifying potential energy beet growers. Because of the modular 20MGY plant design for multiple feedstock, we will be able to begin utilizing a greater portion of feedstock as molasses in year one and a reduced amount of energy beets. This will allow a gradual increase in new energy beet growers each year for the first five years. The plan will call for about 9,000 acres of beets in year one, and 175,000 tons molasses. We expect the first year plan will require about 20 – 25 growers to supply beets for the plant. In the next five years, there would be a gradual reduction in molasses and a like increase in beets until year five where beets would supply 70% of the feedstock and molasses supplying 30 % of the feedstock. We also plan to utilize sweet sorghum as new northern high yielding varieties become available. Sweet Sorghum ha a high sugar content and could fill a supply gap in the late summer period.