Turning Waste to Value ™

BioMass Solution LLC
3510 Parmenter Rd
Middleton, WI 53562

April 30, 2015

Karlene Fine, Executive Director
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Ave Dept. 405
Bismarck, ND 58505-0840

Dear Ms. Fine,

BioMass Solution LLC is formally re-applying for the North Dakota Industrial Commission Renewable Energy Grant program. As a follow up the previous application, the BMS responses to the technical review are also included. Since the last meeting we have made some substantial advancements:

- Conducted testing to prove out the technical feasibility
- Validated solids meet ACS animal feed standards to be able to sell through their high value animal feed channel
- Validated RIN pathway
- Validated the D5 RIN full RFS2 longevity
- Further review of project details and commitment from ACS

At the previous meeting, we were presented with several objections to our project. We understand these objections to be the following and our responses to each of these are outlined in Appendix IV:

- ACS Financial Commitment to the Project
- It is a very long pathway through the EPA new pathway to get SBTs classified as advanced biofuel and get the RINS credit
- The project cannot be financially viable – It is operating at partial capacity
- Project is heavily dependent upon RINS
- Money associated with the Grant will leave the state

As per the requirements outlined for the application process, BioMass Solution LLC has included the following items as part of the application process:

- Application - Electronic Copy and 2 Hard Copies Provided (Separately)
- $100 Application Fee - Included with the hard copy application
- Tax Liability Statement – Electronic Copy Included with Application and Included with Hard Copy Submittal

We look forward to a follow-up discussion with the commission. Please let me know if there is any further information needed as part of the formal application and review process.

Regards,

Jacek P. Chmielewski
Principal
BioMass Solution LLC

Renewable Energy Program

North Dakota Industrial Commission

Application

Project Title: Sugar Beet Tailings to Advanced Ethanol

Applicant: BioMass Solution, LLC

Principal Investigator: Jacek Chmielewski

Date of Application: 12/28/2014

Amount of Request: $500,000

Total Amount of Proposed Project: $1,000.000

Duration of Project: 5 months

Point of Contact (POC): Jacek Chmielewski

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ABSTRACT

Overview: The Applicant (BioMass Solution, LLC or BMS) is developing a small-scale, distributed advanced ethanol plant that will be located in Grand Forks, North Dakota. The BMS plant will use a by-product (Sugar Beet Tailings or "SBT") from the sugar production process from four nearby American Crystal Sugar plants as feedstock for the production of fuel grade ethanol. The plant will also produce high quality animal feed as a by-product. The use of SBTs lowers the environmental impact of the sugar production process. The plant will transform SBTs into a value-added feedstock that will no longer have to be transported for land application nor will a special permit be required for the land application process. The ethanol production will eventually provide stability to local fuel prices. Industry standard (fermentation, distillation and dehydration) ethanol production technologies will be used in the plant in combination with novel incoming feedstock processing. The incoming feedstock processing has similarities to existing processes deployed all over Europe. This new feedstock processing technology will be applied at other future ND plant locations. The plant will be built with larger nameplate capacity than the available SBTs might indicate in anticipation for additional feedstock that is available in the area.

Objectives: The project to be funded includes the Front End Engineering and Design (FEED), detail design and engineering, environmental permitting, property surveying, and insurance reviews. In addition, there will be pre-construction deliverables that include development work, including legal and accounting work associated with the project. At the conclusion of this project, BMS will be in a position to validate the final project budget and timeline, and be in a position to close the debt and equity financing of the plant and start construction. The start-up of the plant is planned for the end of August, 2017. This coincides with the sugar beet harvest and is a critical milestone for the successful start-up of the facility. The NDIC funded project should be completed by the end of 2015 to start construction to meet the aforementioned construction timeline.

Expected Results and Deliverables:

- **Front End Engineering and Design (FEED):** Comprised of three stages of engineering activity, Front-End Loading (FEL) 1, 2, and 3. Each phase provides additional level of detail, testing, and validation of the overall plant design. The FEED culminates with the detail design phase that provides BMS with complete design data and corresponding budget for both the construction (capital expenditures) and operation of the plant (operating expenditures). A detailed description of the engineering package is attached in **Appendix I**.
- **Environmental Permitting:** Required permits will be addressed, including Title V Air Emission and Water requirements.
- **Property Surveying:** A site survey will be completed as part of this project.
- **Insurance Reviews:** The necessary insurance reviews will be conducted as part of this study.
- **Other Pre-construction Development Activities:** Additional activities include legal work (such as contracting with an Engineering, Procurement and Construction firm (EPC) and other vendors and utilities), accounting, office expenses and travel.

Duration: 5 months

Total Project Cost: $1,000,000

- BMS Cost-Share: $500,000
- NDIC Funding Request: $500,000

Participants:

- **BMS** - Project Owner and Operator
  BMS is headquartered in Middleton, WI. BMS is the applicant for the grant and will own and operate the plant located in Grand Forks, ND. BMS will be responsible for the overall project management, plant start-up, and on-going operations. BMS staff will participate in key aspects of the engineering involved in the proposed NDIC project.

BMS will embark on hiring and training of local, ND based engineering and technical talent, that will be employed by the plant both during the commissioning and start-up as well as post start up, operational phases.

- **Beyond Green Integration (BGI)** - FEED Engineering Execution
  BGI provides engineering expertise and key contributor to the critical components of the overall plant design. BGI will also provide 3rd party oversight of the design. BGI is headquartered in Ormond Beach, FL. BGI will be the primary executor of all of the FEED activities.

- **Unitel Technologies Incorporated (UTI)** - Technology and Engineering Provider of the Distillation and Separation Unit Operations
  UTI is headquartered in Mount Prospect, IL, and will be the entity responsible for engineering, building, construction and start-up of the distillation and separation part of the ethanol production process.

- **Resource Engineering Associates (REA)** - Environmental and Civil Engineering Support
  REA is headquartered in Middleton, WI and will be responsible for the environmental issues at the plant, including wastewater management and CO_2 output.

PROJECT DESCRIPTION

BioMass Solution, LLC (BMS) is developing a small-scale, advanced bio-fuel ethanol plant that will be located at an industrial development site in northern part of the city of Grand Forks, North Dakota. This location is near the intersection of Interstate 29 and 18t^{h} Avenue. The plant will utilize Sugar Beet Tailings (SBTs), a product readily available in the Red River Valley agricultural area. SBTs are considered waste from the sugar production process. The SBTs will be used as base feedstock to produce fuel grade ethanol (ASTM D4806, 4814 and Magellan E-Grade denatured fuel grade ethanol standards). The SBTs will come from four American Crystal Sugar (ACS) plant locations. The BMS arrangement with ACS allows ACS to turn cost into revenue. The plant will be able to take in sugar beets from local growers that are considered waste as a result of not meeting size specifications, or excess crops that would otherwise be destroyed. This provides the local sugar beet growers and ACS a buffer to optimize production. In addition, the project contributes to a positive environmental impact by eliminating the land application of tailings, and significantly reducing the overall carbon footprint of the sugar production process. These benefits realized by this project directly contribute to the goals of the North Dakota Industrial Commission's (NDIC) goal to promote efficient, economic and environmentally sound development and use of biofuels.

Figure 1 – Picture of Sugar Beet Tailings (SBTs)

The BMS plant will use standard fermentation, distillation, and dehydration technology in combination with novel SBT pre-processing. The SBT handling and pre-processing is a new process that is being introduced in ND. All the technologies utilized in the plant are well established and proven and will be implemented with performance warrantees in place (ensuring plant overall performance). The key differentiator in this plant design, as compared to existing processes, is the pre-processing step that utilizes standard technologies in an innovative manner. The remaining

processes of fermentation, distillation, and separation are well established and are utilized in a majority of existing ethanol plants. A block diagram of the proposed plant follows:

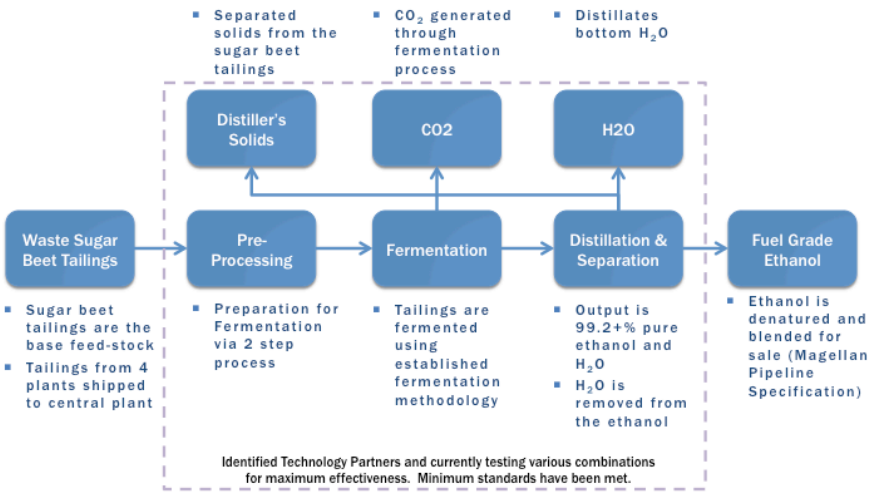

Figure 2 – Block Diagram of the BMS Plant

In principle, the premise is to build a small-scale, distributed advanced ethanol plants that utilize abundant local resources that are considered by-products or waste streams from large scale agriculture and food processing. This model is proven globally and is much more efficient than the centralized, currently prevalent corn ethanol model. The difference is that in the BMS model, the feedstock is already available as opposed to grown specifically for ethanol production. This is advantageous for 2 reasons:

- ACS has already shouldered the cost of collecting, cleaning and handling the sugar beets thus eliminating a significant cost
- Cost of acquisition of whole sugar beets would be competing with sugar production which would push up the feed-stock costs beyond a viable model

In addition, this type of approach helps to build a strong connection between the feedstock supplier/generator, the plant, the local community and can decreases local fuel supply price variations.

The plant that BMS is proposing takes a fresh look at the distributed energy model to make it much more replicable through a standardized and highly automated approach. The only difference in the BMS plant design will be the pre-processing associated with various feedstocks. The plant includes highly integrated, state of the art automation and asset management platforms, allowing for optimization of the process and minimizing downtime for the plant operations.

In this replicable model build-out, key technology partners have been selected to handle the major components of the plant. These are as follows:

- **Pre-Treatment:** Key suppliers include Fluid Quip, Soilnet, Andritz and Vincent. The BMS engineering team will integrate these technologies.
- **Distillation and Separation:** Key suppliers include Unitel Technology for core distillation and molecular sieves from Praj Industries.
- **Fuel Off-take:** This will be designed and provided by BMS. Outside of plant battery limits, Tenaska Commodities, LLC, will handle all of the functions associated with off-take.
- **Solids Effluent:** The solids will be converted to animal feed and sold to an animal feed supplier.

- **Plant Automation:** The overall automation platform will be supplied by Emerson Process Management and will be Delta V. AMS™ (Asset Management System) will be the asset management software package. This system allows for early and predictive detection of operational problems, enabling early response to problems. The instrumentation and valves will be Emerson Process Management.

Upon completion, the plant will be owned and operated by BMS. The plant will have a total capacity of 8,000,000 gallons per year of fuel grade ethanol. In addition 17,000 tons per year of dry distiller's solids, water and biogenic CO_2 by-products are anticipated to be produced.

The BMS plant will launch a new industry, centered on distributed advanced biofuels production. The BMS plant model is planned to be deployed at or near agricultural and food production facilities that have significant food waste or excess food crops. There are several locations in North Dakota and several hundred locations in the United States that can support this model.

In addition, the deployment of a large number of small, distributed fuel ethanol plants all over the United States will help with Renewable Fuel Standard 2 (RFS 2) requirements. The RFS2 standard is a federal mandate that gradually increases the use of renewable fuels in the motor vehicle fuel usage pool. By year 2022, a total of 36 billion of gallons of renewable fuels are to be used in the predicted total fuel pool usage of approximately 130 billions of gallons (applying some current usage as well as future use assumptions). Out of the total 36 billion mandated renewable fuels gallons, 15 billion gallons can originate from corn ethanol with the remainder originating from a myriad of other biological feedstocks. In the case of BMS's plant, the output production will fall under the advanced renewable fuels designation, and will be further classified as a D5 RIN biofuel. RIN's are used as a market vehicle to assign market values to renewable fuels based on a number of factors, perhaps most important being the fulfillment of the RFS's volume requirements. RIN's values are reported daily. There is a strong demand for D5 RIN's as the advanced renewable fuels plants have only recently started coming on-line in the US. The BMS plant will produce D5 RIN's.

The NDIC funds will help fund the first major phase of this project. BMS will complete the FEED and detailed design stages of the project, as well as necessary permitting. This will provide BMS with an accurate project budget and timeline that will lead to successful project completion. Other specific requirements will be:

- Finalize quantity and quality specifications for distiller's solids – Initial testing by ACS has shown that solids exceed their specifications and could be sold through their feed organization, enhancing the quality of the product sold. Additional review of this process needs to occur to finalize this arrangement
- Process and utility battery limits definitions (the division of responsibility between local utility services and the project)
- Other preliminary design information

A detailed description of the FEED is attached as **Appendix I**. The permitting efforts of this project will address both air and liquid discharge. The plant is expected to emit close to 25,000 Tons of biogenic CO_2 and approximately 55,000,000 gallons of clean water per year. The conclusion of this project and the output will be a critical gate for the final round of financing and plant construction by BMS. This project will develop necessary baseline information that will contribute to the expansion of subsequent projects, processes, and activities to support expanded growth of fuel-grade ethanol production in North Dakota.

Expected Results:

The primary expected results will be the completion of the FEED package and the detailed design for the BMS plant. The detailed engineering package will be done with an EPC (Engineering, Procurement and Construction firm) and will provide a final project budget and timeline. This will be the key deliverable from the proposed NDIC project.

Project participants:

- **BMS** - Project Owner and Operator
  BMS is headquartered in Middleton, WI. BMS is the applicant for the grant and will own and operate the plant located in Grand Forks, ND. BMS will be responsible for the overall project management, plant start-up, and on-going operations. BMS staff will participate in key aspects of the engineering involved in the proposed NDIC project. BMS will also be responsible for the distiller's solids management component of the facility. This includes the design and operation.

- **Beyond Green Integration (BGI)** - FEED Engineering Execution
  BGI provides engineering expertise and key contributor to the critical components of the overall plant design. BGI will also provide 3rd party oversight of the design. BGI is headquartered in Ormond Beach, FL. BGI will be the primary executor of all of the FEED activities

- **Unitel Technologies Incorporated (UTI)** - Technology and Engineering Provider of the Distillation and Separation Unit Operations
  UTI is headquartered in Mount Prospect, IL, and will be the entity responsible for engineering, building, construction and start-up of the distillation and separation part of the ethanol production process.

- **Resource Engineering Associates (REA)** - Environmental and Civil Engineering Support
  REA is headquartered in Middleton, WI and will be responsible for the environmental issues, permitting at the plant, including wastewater management and CO_2 (post combustion and biogenic) output.

Following successful start-up of plant operations, BMS will engage in a plan to increase the overall ethanol yield and decrease the plant energy demand The automation platform is designed with built-in capabilities for plant optimization and debottlenecking (removing throughput rate limiting steps). This will enable the plant to achieve as much as an additional 25% of capacity with the original planned hardware and no additional capital spend. New, fermentation residence time optimization technology access has been secured, further debottlenecking the process, reducing the overall fermentation time by 25% and increasing ethanol yield by 1-2%.

Methodology:

Appendix I, contains detailed description of the FEED and detailed design. The design methodology used in this project follows EPC Engineer best practices (Construction Industry Institute). During the FEL-2 phase, an EPC contractor will be brought in to work parallel with BMS on FEL-3 and the detailed design. This methodology will ensure that a proper project delivery budget is established along with a corresponding timeline. The EPC contractor will be responsible for delivery within the established budget and timeline.

It is common industry practice to divide front-end-loading activities into three stages: FEL-1, FEL-2, and FEL-3. For each stage, typical deliverables are listed given below:

FEL-1	FEL-2	FEL-3
▪ Material balance ▪ Energy balance ▪ Project charter	▪ Preliminary equipment design ▪ Preliminary layout ▪ Preliminary schedule ▪ Preliminary estimate	▪ Purchase-ready major equipment specifications ▪ Definitive estimate ▪ Project execution plan ▪ Preliminary 3-D model ▪ Electrical equipment list ▪ Line list

Figure 3 – FEL Description

The NDIC project funding is critical to the overall success of the plant. There is an inverse relationship as depicted by the graphic below with the project risk in relation to the up-front development work that is completed.

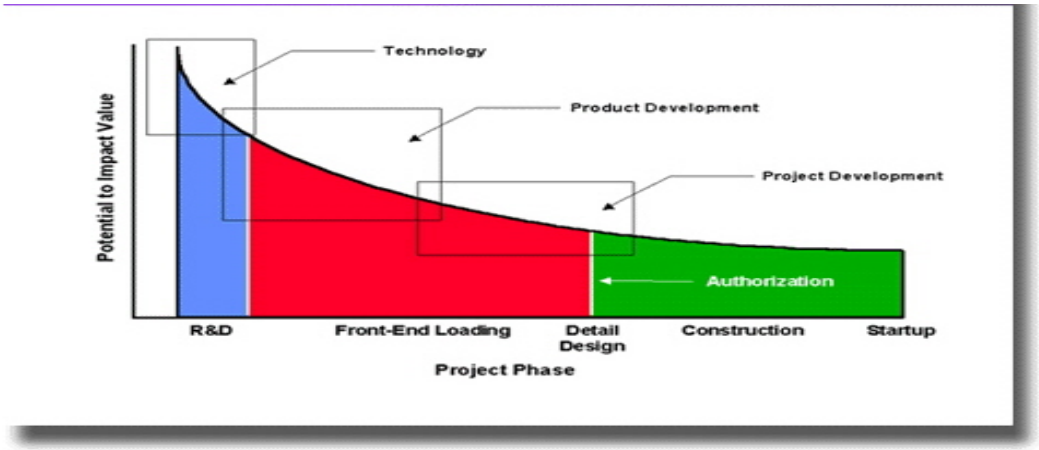

Figure 4 - Relationship of Design in relation with Project Risk

In summary, the design process described above is widely accepted method for lowering the impact associated with later activities as it pertains to detailed engineering (mass, energy considerations) as well as overall project budget. The NDIC funding will allow BMS to decrease overall risk significantly, because it provides the support for preliminary work necessary to make the project successful.

The *Timetable Section* of this document outlines the major phases of the project, beginning with FEL-1 and concluding with detailed design.

Anticipated Results:

With the award of the NDIC funding, BMS will be able to enter into the implementation phase of the project. This will start with procurement of all of the plant components, beginning with the longest lead- time items, and construction activities. The complete project is anticipated to take 17 months from start of design to start-up operations. The NDIC funding is sought for activities associated with the first 6 months of the project, beginning in August of 2015.

The requested funding will help bring to realization several years of effort put into the development of the processes required to run a distributed small-scale ethanol plant. The research conducted in this space by BMS indicates a large number of other plant location candidate sites. The novel process of transforming a typical agricultural waste product to a value-added product as a renewable biofuel is important for further expansion beyond the term of the NDIC funding. BMS has identified several additional sites within North Dakota and numerous other locations across the United States that have the potential to take on this technology successfully.

There are a number of positive economic benefits resulting from the design, construction, and operation of this plant. This project creates jobs related to the production and utilization of North Dakota's renewable energy resources. High-level summaries of the jobs benefits are outlined in the table below. This is also outlined in **Appendix II.**

Type of Job	Number	Average Estimated Pay
Permanent Direct Jobs	18-22	$65,000
Permanent Indirect Jobs	30	$45,000
Temporary Construction Jobs	25	$67,000

Figure 5 - Summary of Jobs Created

Along with job creation, this project aims to address the NDIC's goal of demonstrating to the general public the importance of the State's renewable energy industry, to promote environmentally sound production methods and technologies. The implementation of the distributed ethanol business model will be a catalyst to launching a new industry in ND. It is BMS's intention to allow the plant to be accessible to the local community, particularly to the local students from the local college, technical colleges, and high schools. BMS feels that outreach is a critical success factor to future growth. The outreach allows BMS to educate more broadly on the business model as well as potentially find talent for additional organic growth. Furthermore it is BMS's intention to adhere to open door policy as it pertains to any interested party visit.

The other advantage to the Grand Forks and greater Fargo area will be that there will be a significant available volume of ethanol produced locally. This will help provide an important pricing damper in the fluctuations that are seen in transportation fuel prices nationally. The locally BMS produced ethanol, has a relatively stable pricing structure, subject only to minor external factors.

Facilities:

The requested NDIC funds will finance the remaining engineering activities. The funds will not be used for other development activities or the procuring or build out of any facilities.

The BMS facility will be located in the city of Grand Forks. It is preliminary sited, in an industrial area that currently includes the JR Simplot and the Philadelphia Pasta companies. The location was selected with the help of the Grand Forks Region Economic Development Corporation (GFREDC). The site has all of the key requirements needed for successful operation and fits in well with long-term plans for BMS. A map of the location is shown below:

Figure 6 – Proposed BMS Plant Location in Grand Forks, ND

The BMS site will be conveniently located near the intersection of Interstate 29 and 18th avenue. The location allows for ease of transportation both to and from the plant while maintaining any truck traffic away from populated areas.

Resources:

- BMS will staff Project Development:
  - Jacek Chmielewski – Primary project manager and overall project point of contact
  - Keshav Rajpal – Primary financial and operations management
  - Norm Scheels – Lead engineer
  - Additional engineers as needed for various deliverables

- Additional manpower /resources will be provided by
    - Beyond Green Integration (BGI):
        - Brian McWhorter - BGI will be the engineering activities manager
        - Additional engineers as needed for various deliverables
    - Unitel Technologies Incorporated (UTI):
        - Greg DiCosola - UTI will be responsible for the distillation and separation unit operations
    - Resource Engineering Associates (REA):
        - Robert Pofahl - REA will be responsible for all of the environmental activities
    - EPC Contractor:
        - To be determined as part of FEL-2 activities

Techniques to be Used, their Availability and Capability:

The proposed plant will be divided into six key process areas as described in **Appendix III**.

These areas are:

- Process Area 1 - Receiving and Pre-treatment
- Process Area 2 - Fermentation
- Process Area 3 - Distillation and Separation
- Process Area 4 - Fuel Ethanol denaturing and offtake
- Process Area 5 - Distillers Solids processing and offtake
- Process Area 6 - Water and CO_2 treatment

Environmental and Economic Impacts while Project is Underway:

The NDIC grant will fund design (FEED and Detailed Design) for the BMS plant, in addition to other development work. The other critical components of work are permitting; land survey, insurance and related legal and accounting work. This project will also encourage the development of practices that will reduce adverse environmental impacts of renewable energy activities. The environmental impact of the proposed project will be nominal. The production process requires water, naturally occurring yeast, electricity, and steam power. There are no chemicals or other environmentally impacting items used in the operation. In addition, the whole plant is enclosed in a relatively modest area. The key elements of discharge include:

- ~55,000,000 gallons per year clean water (Treated on-site)
- ~25,000 tons of biogenic CO_2 (this is carbon neutral CO_2) + combustion CO_2
- ~ 17,000 tons of dry distillers solids, as discharge outputs.

The environmental permitting, monitoring requirements will be carried out with full adherence to the local ND Department of Health - Chapter 33-14-15 - Designated Air Contaminant Sources - Permit to Construct, Minor Source Permit to Operate, Title V Permit to Operate or Synthetic Minor Source.

The economic impact of the BMS project is outlined in both **Figure 5** and in **Appendix II**. Along with temporary construction jobs (25+), the plant will require 18-22 operations jobs as well as 30 transportation jobs. The 2015 (from project kick-off) and 2016 (through start-up) the total number of jobs will vary between 35 in 2015 to 45 during commissioning and start-up and up to 52 thereafter. The average pay for the operations of the plant will be $65,000 per year.

In addition to the jobs, it is BMS's intention to engage local North Dakota suppliers to augment the required materials and services throughout the construction phases.

Ultimate Technological and Economic Impacts:

The technological impact of the BMS plant will be significant, bringing new industry (small distributed advanced ethanol production) to ND. This industry is anticipated to be replicable at a number of other locations in the state. Each additional plant will have a similar technological and economic impact.

The economic impact of this project also has a high potential for creating new renewable energy jobs, wealth, and tax revenues for North Dakota. The economic impact of the plant is anticipated to consist of job creation, local tax base contribution, outreach generated activity and contributing to bringing stability and potentially lowering fuel pricing in the Grand Forks, ND area.

The matching funds for the grant will come from a combination of development funds provided by equity investors ($250,000) and BMS, which will provide in-kind engineering support in kind ($250,000).

Why the Project Needed

With the award of the NDIC funding, BMS will be able to enter into the implementation phase of the project. This will start with procurement of all of the plant components and construction activities. The complete project is anticipated to take 17 months from start of design to start-up operations. The NDIC funding is sought for activities associated with the first 5 months of the project, beginning in August of 2015. The proposed NDIC project is critical to the overall success of the plant. There is an inverse relationship with the project risk to the up-front development work that is completed. The NDIC funding will allow BMS to decrease overall risk significantly, because it provides the support for preliminary work necessary to make the project successful.

STANDARDS OF SUCCESS

The BMS project will be the first waste to fuel distributed advanced fuel ethanol plant in North Dakota. The plant provides two distinct benefits to the area. The first is that it eliminates a significant waste stream (over 300,000 tons per annum) that needs to be handled on an annual basis. The second is that it provides a local source of fuel ethanol that will help buffer transportation fuel price fluctuations for the local residents and businesses.

The business model centered on small-scale distributed energy plants utilizing a large localized waste stream builds the foundation for waste to energy projects in North Dakota and across the United States. This business model is a key component of the United States becoming energy independent as well as providing for renewable and sustainable biofuels production. The production of fuel ethanol from waste feedstock will make North Dakota a leader in sustainable energy production.

The BMS produced fuel ethanol, will eventually be sold into the local fuel supply pool in the form of E10 (10 vol% ethanol and gasoline blend), E15 (15 vol% mix currently already mandated in a number of states) as well as E85 (85 vol%, blend that can be combusted in flex fuel vehicles as well as any post 2003 production year vehicles (with an addition of a fuel to air ration computer)) blends. A number of E85 retail fueling stations exist in the Grand Forks and Greater Fargo area (http://www.ethanolretailer.com/flex-fuel-station-finder/). The supply of BMS fuel ethanol into the local retail pool will allow for price stability in the ethanol portion of the fuel blend mixture.

In addition to the above described advantages, both public (schools, cities, villages) as well as private owner fleets can take advantage of dedicated E100 and E85 fueling stations especially in the light of the newly available ethanol/diesel combusting engines. Implementation of the above fuel ethanol, local uses will have a stabilizing effect on the impact of transportation costs for the local economy in Grand Forks and Greater Fargo areas, by making local businesses more competitive and financially sustainable for the long term.

The measurable deliverable in the BMS project will be detailed project timeline and budget that provides the final step in financing and construction of the plant. The result of passing this milestone will be economic development outlined earlier in this application as well as summarized in **Appendix II**.

As indicated earlier, BMS plans to showcase the plant for outreach purposes. To support the NDIC goals, BMS aims to encourage and promote the use of new technologies and ideas that will have a positive economic and environmental impact on renewable energy development and production in North Dakota. BMS plans an open door policy with the local universities, technical colleges, research institutes and high schools. BMS feels it is mutually beneficial to actively participate in such forums. In addition, BMS will actively participate with the State of North Dakota in promoting the renewable fuel industry.

BACKGROUND/QUALIFICIATIONS

Biomass Solution, LLC (BMS) will be the primary party that will be managing the development project and ultimately the construction, start-up and on-going management of the ethanol facility. The initial FEED and associated development work will be activities that are covered by this grant. Key members of the management team that will be involved with this project are the following:

- **Jacek Chmielewski -** Principal and founder of BMS, Chmielewski will be responsible for the project management. Chmielewski brings a global perspective after living on 4 continents. Chmielewski has over 25 years of experience in the energy field. He started his career in hydrocarbon processing and has focused the last 10 years on renewable fuels and energy. Chmielewski has his undergraduate degree in Chemical Engineering from the University of London. His area of expertise is process controls and has been responsible for starting up many different plants over his career.
- **Keshav Rajpal -** Principal in BMS, Rajpal will be responsible for the financial and business operations of the facility. Rajpal brings over 20 years of corporate operations and finance experience. He spent his first 10 years in management consulting with large fortune 500 companies globally. Rajpal has his undergraduate degree in Mechanical Engineering from the University of Wisconsin and his Masters of Business Administration from the Northwestern Kellogg School of Business in Chicago.
- **Norm Scheels -** Chief Engineer for BMS, Scheels will be the primary engineering lead that will be coordinating the deliverables for the FEED. Scheels has 35 years of experience designing and operating ethanol plants in the Midwest. Scheels has his undergraduate degree in Physics, Masters in Civil Engineering and an additional Masters in Environmental Engineering all from the University of Wisconsin.
- **BMS Engineering Support Staff -** Additional support engineers will be engaged as needed for various design activities. These will include items such as detailed drawings, energy and mass balance calculations, operating cost calculations, and budget validation.

Critical components of facility will also have engineering support being provided by the corresponding technology providers. The key component in the ethanol process will be alcohol distillation and molecular sieves (separation). Unitel Technologies (UTI) will be providing the engineering services with these components. UTI has developed over 1,300 facilities globally and is an expert in small-scale production facilities.

BMS will also be engaging a third party for review of the FEED deliverables. Beyond Green Integration, LLC (BGI) will handle this. BGI provides third party engineering services to the energy industry globally. Their client list spans the largest petrochemical companies globally to smaller renewable energy companies.

Resource Engineering Associates (REA) will provide civil engineering services. REA has over 20 years of experience in providing agricultural, civil, and environmental services in upper Midwest.

MANAGEMENT

BMS has a combination of 5 resources that will be engaged in the NDIC co-funded project. The project will be overseen by the 3 resources (background and qualifications included above) that will oversee the management, technical and legal aspects of its business operations. These individuals have over 80 years of combined experience in launching new companies, developing projects within established companies, and the successful rollout of technologies.

In addition, BMS has engaged 3 engineering firms for specialty engineering needs and third party review. UTI will provide engineering support for the distillation and mole sieves components. REA will be providing civil engineering services for the plant site and the water treatment handling. BGI will be providing 3rd party review of the deliverables to ensure that the design is complete. Each firm is contracted with customary provisions as to the quality of the services and work product. Evaluation points will occur upon each delivery of documentation from the engineering firms, and corrective action will be taken at that time.

The phases of the FEED are detailed in the timeline included below in the *Timetable* section. Each phase of the project has key deliverables that are part of the completion of the phase. Interim reports will be delivered to the NDIC, if required.

TIMETABLE

Below is the proposed project timeline associated with the project:

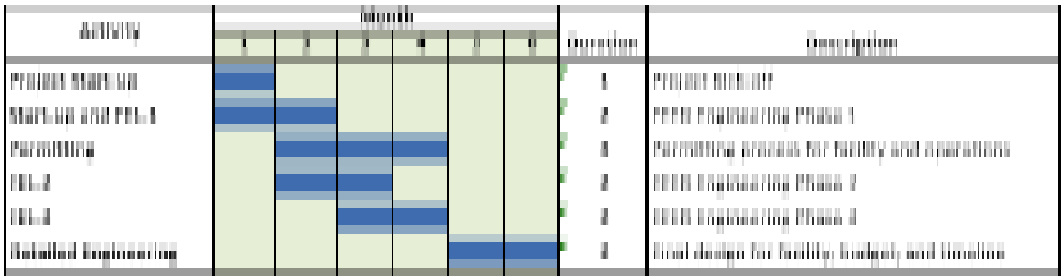

Figure 7 – NDIC Project Timeline

BUDGET

Below is a list of associated expenses associated with the project:

Project Associated Expense	NDIC's Share	Applicants Share (Cash)	Applicants Share (In-Kind)	Other Project Sponsor's Share	Totals
Engineering	$500,000	$200,00			$700,000
Permitting			$120,000		$120,000
Legal			$130,000		$130,000
Accounting/Tax		$30,000			$30,000
Misc. (T&E, etc.)		$20,000			$20,000
Totals	**$500,000**	**$250,000**	**$250,000**		**$1,000,000**

Figure 8 – Project Budget Summary

Please use the space below to justify project associated expenses, and discuss if less funding is available than that requested, whether the project's objectives will be unattainable or delayed.

A majority of the project expenses are associated with the engineering design work. There has been a significant amount of preliminary work done to date by the BMS team. The remaining amount is relatively small given the nature of a facility. The remaining engineering development expenses, total $700,000.

The estimated expenses for environmental permitting ($120,000) represent the fees of the third-party firm for any necessary studies (~$70,000) and out-of-pocket expenses including permit costs (~$50,000).

The estimated expenses for legal ($130,000) and accounting and tax ($30,000) includes a wide range of development activities that will enable BMS to complete financing and commence construction. This includes planning and entity formation and structuring, and contracting with ACS, Tenaska Commodities, utilities, the EPC, and debt and equity financing sources.

The additional miscellaneous pre-construction, development expenses (estimated at $20,000) include office expenses and clerical staff support ($10,000) and project related travel ($10,000). The travel will involve ~15 trips from Middleton WI, and Chicago IL, over the duration of this project.

If less funding is available, BMS believes that the project can be done but puts some risk since the timeline of project is tied to the sugar beet harvest season. Best efforts would be put forth to raise outside funding with a focus on completing the FEED activities.

CONFIDENTIAL INFORMATION

BMS wishes to keep the information contained in the Appendices as confidential. As per the application instructions, the details are outlined below:

(a.) A general description of the nature of the information sought to be protected

a. The information that BMS is seeking to protect is located in the three attached appendices (Appendix I, II,III,IV, and V).

(b.) An explanation of why the information derives independent economic value, actual or potential, from not being generally known to other persons

a. These three appendices provide details on the initial plant deliverables that are specific to this project, operating details related to personnel required, and an overview of the BMS plant processes.

(c.) An explanation of why the information is not readily ascertainable by proper means by other persons,

a. This information has been compiled by BMS over the past several years and is dependent upon the technologies and process that were developed specifically for this project. Other parties may be able to develop similar information but the information provided is highly specific to the project outlined in this application.

(d.) A general description of any person or entity that may obtain economic value from disclosure or use of the information, and how the person or entity may obtain this value

a. Another entity could use the information to develop a competing project in Grand Forks or in another location with similar dynamics that BMS will be looking to develop in the near future.

(e.) A description of the efforts used to maintain the secrecy of the information.

a. This information has only been share with BMS technology partners through non-circumvent NDA's and business arrangements. This information has not been shared outside of those business arrangements.

PATENTS/RIGHTS TO TECHNICAL DATA

BMS wishes to reserve all rights to any patents and other intellectual property developed directly or indirectly as a result of the funding of this project, including, but not limited to, any inventions, deliverables and technical information created.

Turning Waste to Value ™

BioMass Solution LLC
3510 Parmenter Rd
Middleton, WI 53562

April 30, 2015

Karlene Fine, Executive Director
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Ave Dept 405
Bismarck, ND 58505-0840

Dear Ms. Fine,

BioMass Solution LLC is confirming that there are no outstanding tax liabilities to the State of North Dakota.

Regards,

Jacek P. Chmielewski
Principal
BioMass Solution LLC