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GUARDIAN ENERGY

January 25, 2019

North Dakota Industrial Commission
ATTN: Renewable Energy Program
State Capitol, 14th Floor
600 East Boulevard Ave. Dept. 405
Bismarck, ND 58505-0840

Subject: Submission of NDIC Renewable Energy Council Grant Application

Dear Members of the Renewable Energy Council:

Please accept the attached proposal titled "New Implementation of Stack Heat Recovery Technology to Increase Efficiency and Production at Existing Ethanol Production Facility," submitted on behalf of Hankinson Renewable Energy, LLC (HRE) for your consideration for Renewable Energy Program grant funding.

The proposed project will take place within the existing perimeter of HRE's plant located in Hankinson, North Dakota.

The project entails the installation of a Stack Heat Recovery (SHR) system to improve energy efficiency and savings while increasing ethanol production. The technology is new to the ethanol production process in North Dakota and is designed to capture waste heat released from the plant and recycle it back into the production process. HRE will research and test the viability of the technology in the production process for potential use within the broader North Dakota renewable energy industry.

As Chief Financial Officer (CFO), I will serve as Principal Investigator and the primary contact for the project.

Hankinson Renewable Energy, LLC, a subsidiary of Guardian Energy Management, LLC, hereby commits to complete this project as described in the attached proposal.

If you have any questions, please contact me at (952) 465-0229 or dodi.matti@guardiannrg.com.

Sincerely,

Dodi Matti

Dodi Matti, CFO
Guardian Energy Management, LLC
4385 Fountain Hills Drive NE, Suite 301
Prior Lake, MN 55372

Renewable Energy Program

North Dakota Industrial Commission

Application

Project Title: New Implementation of Stack Heat Recovery Technology to Increase Efficiency and Production at Existing Ethanol Production Facility

Applicant: Hankinson Renewable Energy, LLC

Principal Investigator: Dodi Matti

Date of Application: January 25, 2019

Amount of Request: $500,000

Total Amount of Proposed Project: $3,242,569

Duration of Project: April 1 – November 30, 2019

Point of Contact (POC): Dodi Matti, CFO

POC Telephone: Office: (952) 465-0229

POC Email: dodi.matti@guardiannrg.com

POC Address: 4385 Fountain Hills Drive NE, Suite 301, Prior Lake, MN 55372

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ABSTRACT

Objective:
The purpose of this proposal is to request funds from the North Dakota Industrial Commission (NDIC) Renewable Energy Program to assist Hankinson Renewable Energy, LLC (HRE) with a project that will implement an innovative method to improve the plant's energy efficiency and increase its production of renewable energy through the installation of a Stack Heat Recovery (SHR) system. The selected SHR system is a novel approach to energy efficiency in North Dakota's renewable energy industry. The goal of this project is to test the viability and effectiveness of the technology in the ethanol production process.

The SHR system is designed to capture excess heat energy released from the plant's dryer exhaust stack and recycle the heat back into the production process. In addition, the system will collect water condensation from the dryer exhaust stack and use it for boiler make-up and process water. In effect, the system will improve efficiency by decreasing natural gas and make-up water needed, while increasing the production of ethanol and coproducts.

Expected Results:
The SHR system installation project will resolve HRE's current steam-related limitations. HRE will become more efficient through the capture of heat that will be used for steam needed in production, resulting in decreased natural gas usage and increased biofuels production. The project is expected to increase ethanol production by an estimated 10 million gallons per year (MMGY).

Successful project outcomes related to efficiency and production improvements have the potential for replication at other ethanol production facilities. The project has potential to affect the broader North Dakota renewable energy industry by helping to establish a proven and marketable new technology option, as well as preserving and creating renewable energy jobs, wealth and tax revenue.

Duration:
The installation and testing of the SHR System will occur from April 1, 2019 – November 30, 2019.

Total Project Cost:
HRE budgeted the total project cost at $3,242,569.

Participants:
Hankinson Renewable Energy, LLC, owned by Guardian Hankinson, LLC and managed by Guardian Energy Management LLC, will collaborate with IntegroEnergy Group, Inc., Par Piping & Fabrication, LLC, and Power System Engineering, Inc. for the duration of the project.

PROJECT DESCRIPTION

Objectives:

Install Stack Heat Recovery System

Hankinson Renewable Energy, LLC's (HRE's) project involves installing and investigating the effectiveness of a Stack Heat Recovery (SHR) system in a renewable energy production facility. The primary objective is to install the SHR system to improve process efficiencies, increase ethanol production by an estimated 10 million gallons per year (MMGY), and decrease certain inputs like make-up water and, especially, natural gas. Ultimately, the technology will reduce natural gas use by approximately 2,600 BTU (British Thermal Units) per gallon of ethanol produced.

Resolve Steam Limitation Issue and Reduce Natural Gas Usage

HRE's current ethanol production rate is steam-limited during the winter months inhibiting the plant's ability to produce ethanol, thereby limiting overall production. The proposed SHR system project will address this limitation and reduce operational costs through efficiency improvements. The improvements made possible by the SHR system include the successful capture and reuse of process heat and water during the production process resulting in decreased natural gas and make-up water needed, and increased production and cost savings.

Increase Production

The proposed SHR System project will address current steam system limitations and reduce operational costs. Post-project, reduced natural gas usage will continue to increase cost savings while allowing for higher production levels without needing to increase natural gas usage for the increased production.

The SHR system will remove BTUs from the Thermal Oxidizer (TO) stack and convert to low-pressure steam. Currently, this stack exhausts 330° air, and would exhaust under 250° air post project, using this recovered heat to produce steam. The improvements to the plant's production process will allow for the TOs to be backed down to design capacity, extending their life and allowing the plant to utilize this capacity to increase its ethanol production rate and increase production by approximately 10 MMGY.

Establish Viability of the SHR System Technology in the Renewable Energy Production Process

Once the SHR system technology is implemented, HRE will monitor key areas of production to measure and assess outcomes. Through production analysis and comparisons on natural gas, water, and production costs, HRE will determine whether the SHR system is a viable technology for the renewable energy production process. If successful, the SHR system will be a technology with proven effectiveness in the renewable energy marketplace.

HRE's project goals go beyond the scope of the plant and reach the broader renewable energy industry, particularly in North Dakota. This project meets NDIC's goals of identifying and developing renewable energy technologies presently not used in North Dakota. The objectives of the project encourage the development of new practices that will reduce adverse environmental impacts of renewable energy activities. Moreover, HRE's objective to test the viability and efficiency of the SHR system has the potential to develop baseline information that will lead to other projects, maximize the market potential for renewable energy resources, and promote the advancement of new practices in the industry.

Methodology:

System Installation

The first objective of the described project is to install the SHR system, designed by IntegroEnergy Group, Inc. IntegroEnergy in an engineering firm that specializes in the biofuels industry, and they have a proven track record of designing waste heat recovery systems like the one proposed for HRE. The mechanical contracting will be done by, Par Piping & Fabrication. Par Fabrication is registered to do business in North Dakota and has several years of related experience with the installation of equipment and piping, including work done at ethanol plants. The installation will require an electrical contractor, as well. Power System Engineering, Inc. has several years of relevant industrial electrical and instrumentation integration and will complete the electrical and controls design.

Heat Recovery

The SHR system is new to the ethanol industry, and it has not yet been installed at North Dakota ethanol plants. Testing is still needed to fully show its effects on increasing production efficiency. Analysis will include testing the system's ability to capture spent heat and recycle it for production of steam for operations, and quantifying the system's ability to reduce natural gas usage and increase ethanol production.

The SHR system is designed to remove BTUs of heat energy from the Thermal Oxidizer (TO) stack and convert the heat to low-pressure steam. Capturing this heat for steam production will help HRE overcome current steam limitations during winter months. Steam produced by the SHR system is anticipated to equal one-third of the steam needed for the evaporators. The SHR system will supply 30,000 lbs/hour of steam to the evaporators recovered from the TO stack. HRE will monitor the effectiveness of the system by measuring and recording pre- and post-dryer exhaust stream temperatures, which will demonstrate the heat recovery.

Efficiencies in Production

Another objective for this project is the reduction of natural gas and make-up water. HRE will monitor and record natural gas usage during production. Calculations will be performed to demonstrate natural gas usage per gallon of ethanol produced (BTU/gal). The plant will document and analyze results for efficiency statistics. HRE will monitor and record water usage based on the average water used per gallon of ethanol produced. As a critical component to investigating efficiencies in production, HRE's research team will measure and record production on a daily basis for future status reports and comparative analysis. HRE will analyze each data variable against the anticipated results for the SHR system.

Anticipated Results:

The plant expects the installation of the Stack Heat Recovery system to increase operational efficiencies and boost ethanol production by a conservative estimate of 10 million gallons per year (MMGY). The SHR system, designed by IntegroEnergy Group, Inc., will remove BTUs from the Thermal Oxidizer (TO) stack and convert this heat to low-pressure steam. Currently, this stack exhausts 330° air and would exhaust under 250° air post project, by using this recovered heat to produce steam. Steam generated by the SHR system is anticipated to equate to one-third of the steam needed for the evaporators. The SHR system will supply 30,000 lbs/hour of steam from the TO stack, which is approximately 10 – 14% of the current steam produced at the facility. This heat recovery process is expected to save approximately 1,050 MMBTU/day of natural gas. Moreover, the water condensation recovered by the SHR system will be of high quality and recycled back into the plant water system. HRE expects to reclaim an estimated 30 gallons of water per minute, or 43,200 gallons of water per day from the dryer exhaust stream. This

means the plant will reduce the amount of make-up water it needs, meaning water savings for the plant and less water used from the production wells.

The improvements to the plant's ethanol production process will allow the TOs to be backed down to design capacity, extending their life and allowing the plant to utilize this capacity to increase its ethanol production rate. The additional steam capacity, estimated to be as much as 14%, is expected to increase production by the same percentage because the plant is currently steam-limited. HRE is anticipating to increase its ethanol production from 149 MMGY to 159 MMGY post project.

As a result of the installation of the SHR system and the subsequent research, the plant expects to decrease natural gas usage. This decrease in natural gas usage is expected to improve HRE's carbon intensity (CI) score by an estimated 2.5 points. Carbon intensity the measure of greenhouse gas emissions associated with the production and consumption of a fuel. HRE's improved CI post-project means HRE's ethanol would be "cleaner" because its production results in reduced carbon dioxide emissions in a lifecycle analysis.

HRE expects the net savings from the reduction of natural gas costs to be $1,400,000 annually for a 2.4-year payback. The 10-year IRR is 40.62% and the NPV is $2,920,000.

Facilities:
Hankinson Renewable Energy, LLC (HRE) is an ICM-designed dry mill ethanol plant operating in Hankinson, ND since 2009. Currently, HRE produces 149 MMGY of ethanol. The plant is located on a 221-acre lot in Richland County. The proposed SHR system project will be installed within the existing footprint of the plant.

Resources:
The HRE facility is optimal for the installation of the SHR system. No expansion is necessary for the project, and the plant has the space readily available. Internally, project managers and employees of HRE are prepared to oversee the installation of the system and conduct the subsequent research through the daily monitoring practices already established. Par Piping and Fabrication, LLC will install the technology to work throughout the plant and IntegroEnergy, the system designer and engineer, will be accessible as a resource if needed; however, the SHR system is designed to be low-maintenance and easy to operate, so limited hands-on oversight from IntegroEnergy is expected. The network available to HRE through Guardian Energy Management, LLC is vast. A strong and experienced team of experts will manage the development of the project, oversee the research, and ensure the successful execution of the project.

Techniques to Be Used, Their Availability and Capability:
The Stack Heat Recovery system is a simple design created to remove BTUs from the Thermal Oxidizer (TO) stack and convert to low-pressure steam. Currently, HRE is limited in steam availability during colder months. The SHR system has the capability to capture waste heat and convert it into low-pressure steam without requiring additional natural gas usage for heat in steam production. The technique used by the technology is within the function itself, however, the methods used to test the viability of the system in the ND renewable energy system will require careful and frequent monitoring of steam production, natural gas usage, water usage, overall cost savings, and other means to measure efficiency. The objective is to analyze the calculations to ensure that the SHR system is saving natural gas and water per unit of ethanol produced and demonstrating the practicality of a successful energy efficient technology in the North Dakota renewable energy industry.

While the system is a new configuration and a proprietary technology, system components are comprised of mainly of off-the-shelf equipment, and spare parts are readily available. To ensure the optimal performance of the SHR system, HRE will conduct and record regularly scheduled preventative maintenance inspections. The heat exchangers used are static equipment with low failure rates. HRE's researchers will examine the exchangers at regular intervals for fouling and degradation.

Environmental and Economic Impacts while Project is Underway:
The installation of the SHR system does not present any adverse ecological or economic impacts. Capturing and recycling of waste heat means energy savings through reduction in natural gas use and emissions. The SHR system also positively affects the environment through water conservation. The water condensed from the SHR System will be of high quality and will be recycled back into the plant water system, reducing water usage by approximately 0.2 gallons of water per 1 gallon of ethanol produced.

Additionally, as the private entity is installing the system and conducting research, there are no adverse economic impacts outside the scope of the project. Instead, the technology is projected to increase production and operational efficiency, presenting the potential for additional jobs at the HRE plant in the future as ethanol and coproducts production increases are fully realized. Moreover, the testing of the SHR system should prove beneficial economic impacts within the plant. Increase production, improved efficiency, the reduction of natural gas usage, and encompassing cost savings will positively affect the financial status of HRE. Additionally, the goal of the research is to verify the success of the SHR system in an ethanol plant to transfer the positive impacts to the broader renewable fuels industry in North Dakota.

Ultimate Technological and Economic Impacts:
The proposed project promotes the development of the state's renewable fuels industry through a technology that reduces costs, and increases operational efficiencies and biofuels production. Moreover, through the increased production at HRE and other ethanol plants that may implement the installable technology in the future, there is the potential for renewable energy job creation.

Renewable energy industries in North Dakota have not yet implemented or tested the SHR system in the state, which makes the project a novel approach to energy savings and production improvement. If the technology is successfully tested though HRE's project, the North Dakota renewable fuels industry will be supporting the introduction of a system improvement that promotes positive economic and environmental impact while encouraging the use of new technologies within the renewable fuels industry.

The growth in ethanol and coproducts production will increase the need for corn feedstock from local agricultural producers. Additionally, agricultural producers will have more access to coproducts like distillers grains and corn oil for livestock feed, provided by HRE. The proposed project has numerous economic benefits, which have the potential to increase wealth and tax revenues in North Dakota.

Why the Project is Needed:
HRE's current ethanol production rate is limited by steam during the winter months. The proposed SHR System project will address these current steam system limitations while reducing operational costs. The SHR system will allow HRE to resolve the steam limitations capturing heat energy otherwise lost and recycle it into steam production for plant operations. This means the plant will be able reduce its natural gas usage, since the SHR captured heat will be used for increased steam production instead of natural

gas. The SHR system will decrease natural gas usage leading to cost savings while simultaneously boosting its ethanol production capacity by resolving the steam limitations. Moreover, lower natural gas usage also reduces emissions from the combustion of fossil fuels. The SHR system is easy to operate, maintain, and integrate into existing ethanol plant systems; and the system provides a strong payback than other solutions examined. The project will allow for a viable solution to address current steam limitations while increasing the efficiency and profitability of HRE.

The proposed project will also provide the North Dakota renewable fuel industry with an efficient, economical, and environmentally beneficial process to increase ethanol production while promoting the use of new technologies. The installation of the Stack Heat Recovery system in an ethanol plant will encourage the development of new practices that will mitigate adverse environmental impacts of renewable energy activities. The system achieves this by capturing spent heat and recycling it into the production process to increase production efficiency, reduce natural gas usage and make-up water needed, and other associated costs.

HRE intends to research the viability and effectiveness of the SHR system in the plant's ethanol production. The project is needed to analyze and present quantitative results that will provide a baseline of information for other projects and processes to improve the renewable fuels industry in North Dakota. Overall benefits specific to HRE include increased revenue through improved ethanol production by 10 MMGY, reduced operating costs through reduced inputs like natural gas and makeup water, and providing data on the technical feasibility of the SHR system. Furthermore, the project augments North Dakota's agricultural sector by increasing the use of ND-grown corn for HRE's increased production, increasingly the availability of high-quality feed products like distillers grains for ND livestock farmers, and improving value-added agriculture revenue in the state.

STANDARDS OF SUCCESS

Hankinson Renewable Energy, LLC's (HRE's) project is focused on installing and testing a new Stack Heat Recovery system in its ethanol production facility. Through research and data collection of the effectiveness of the system, the deliverables of the project are central to the proving the viability of this system at an ethanol plant. The SHR system will capture waste heat exhausted from dryer exhaust and recycle it to create low-pressure steam to be used into evaporation during the ethanol production process. The technology, designed by IntegroEnergy Group, Inc., will also collect the condensed water from the dryer exhaust stack and use it for boiler make-up and process water. In effect, the system will improve the ethanol production process by reducing the use of natural gas for steam production and increase ethanol production. The measurable deliverables that will quantify the success of the project include natural gas and makeup water savings, and ethanol production increase.

The methods taken to measure the objective will calculate the steam produced by the SHR system is anticipated to equate to one-third of the steam needed for the evaporators. The SHR system will supply 30,000 lbs/hour of steam from the TO stack, which is approximately 10 – 14% of the current steam produced at the facility. Moreover, the water condensed from the SHR system will be of high quality and will be recycled back into the plant water system, meaning a reduction in makeup water needed. This project will test for a successful reduction of water usage by 0.2 gallons of water per 1 gallon of ethanol produced.

Furthermore, HRE's investigation into the SHR system's viability will measure the reduction of natural gas use for production and the correlating cost savings. The primary objective is to test effectiveness of the SHR system for recapture of heat, reduction in natural gas usage, and overall cost savings. If successful, the project will introduce a new technology to the North Dakota renewable energy industry.

The deliverables mentioned above will benefit HRE's private business. However, the research conducted through the project will promote the use of new technologies, develop research, and grow the broader renewable energy industry in North Dakota. The successful installation of the SHR system will increase ethanol production, reduce the use of natural gas and water, and necessitate additional feedstock from the private and public sector to supply the plant. The measurable deliverables will pave the way for other North Dakota renewable energy industries to advance production and energy savings based on the completion of the project. This, in turn, could spur new biofuels jobs and other related economic development in the state. In effect, the project upholds the NDIC's mission to promote the growth of North Dakota's renewable energy industries through research, development, and education.

The expected deliverables during this project include:

1. Installation of the Stack Heat Recovery System
   The first objective in the proposed project is to install the SHR system. The installation will require equipment and contractors to optimize the utilization of the technology and the ethanol plant. Once the installation is complete, HRE's team will run diagnostics to ensure that the technology is ready for full utilization and subsequent data collection. The deliverable is confirmation of the installation and start-up of the SHR system.

2. Data on Production Efficiency
   The SHR system will lead to various production efficiencies. These include the capture and use of excess heat energy released from the plant and recycle the heat back into the production process. This will increase production efficiencies and reduce the natural gas usage and make-up water needed for ethanol production.

   HRE's project managers will oversee the data collection on the outputs of the SHR system concerning efficiency and production growth. Reports, results, and statistics will be a primary deliverable for HRE's use and analysis on the SHR system's overall viability and productivity. Reports to NDIC will include specific information for the effects of the SHR System again the baseline (current operations without the SHR system) and will be submitted each trimester, or as required by the NDIC, during the first year of production upon completion and start-up of the SHR system. Reports will detail

   - Changes to steam production amounts
   - Changes in natural gas – BTU/gal
   - Changes in make-up water usage – gal of water/1 gal of ethanol
   - Ethanol production – overall production increase

   Reports will also detail any unexpected changes to other inputs (e.g. electricity kWh/gal, etc.). A final report one year after start-up of the SHR system will be completed to quantify the full effect of the SHR on one production year at the plant. Other semi-annual or annual reports will be provided, as required by the NDIC.

3. Production Growth
   The SHR system will resolve HRE's current steam-related limitations and increase the efficiency of heat recycling and overall productivity concerning natural gas and water usage. This will allow for increased ethanol and coproduct production. The SHR system will an efficient means to grow production by 10 MMGY. As previously noted, HRE will provide a report to NDIC one year after start-up to quantify the full effect of the SHR system. This report, and any others required by the NDIC, will detail the effects of the project on overall ethanol and coproducts production.

4. New Technology
   The project can benefit the North Dakota renewable energy industry by helping to establish a proven and marketable new technology option. The collected information on efficiency and production improvements through the SHR system at HRE will provide quantitative data in support of the effectiveness of this technology and will provide a standard that the technology is successful and that results may be replicable at other ethanol plants in the state.

5. Rural Development
   Data showing that the SHR system successful increases ethanol production will provide evidence promoting rural development growth. HRE purchases all of its feedstock from area corn farmer. HRE's ability to increase its ethanol production means they are purchasing more corn from North Dakota farmers. In addition, the success of HRE's project means the growth of ethanol production in the state, which suggests the potential for new jobs in the state's renewable energy industry.

BACKGROUND/QUALIFICATIONS

Background and qualifications of the individuals and entities that will be involved in the SHR System project can be found in the Appendix attached to this grant application.

Table 1: Individuals/Entities involved in SHR System Project

Individual/Entity	Role
Dodi Matti	Chief Financial Officer, Principal Investigator
Hankinson Renewable Energy, LLC	Applicant for NDIC Grant
Guardian Energy Management, LLC	Managing Company for HRE
IntegroEnergy Group, Inc.	Engineering Firm, SHR System Designer
Par Piping & Fabrication, LLC	General Mechanical Contractor
Power System Engineering, Inc.	Electrical Designer
Tracey Olson	Chief Operations Officer, Assisting Principal Investigator for SHR Project
Lee Poppe	Plant Manager, Assisting Principal Investigator for SHR Project
Travis Bolte	Maintenance Manager, Project Manager for SHR Project
Matthew Quinn	Production Manager, Assisting Project Manager for SHR Project

MANAGEMENT

Table 2: HRE's Management Team

Management Team Member	Role
Dodi Matti	Chief Financial Officer, Principal Investigator
Tracey Olson	Chief Operating Officer
Lee Poppe	Plant Manager, Assisting Principal Investigator
Travis Bolte	Maintenance/Project Manager, Assisting Principal Investigator
Matthew Quinn	Production Manager

Dodi Matti, CFO, will take on the role of Principal Investigator. Matti will work with HRE's management team to oversee the entirety of the project, report on the documented data, and analyze overall results. Tracey Olsen, COO, will manage the SHR installation project. Plant Manager, Lee Poppe, and Maintenance/Project Manager, Travis Bolte, will oversee all installation activities, as construction will be a part of the plant's day-to-day process from April to November 2019. Matti and Poppe will work together to manage the contractors.

IntegroEnergy is the system engineer and designer. They will work with HRE leadership and staff for installation, process tie-in, start-up, and SHR system testing. Par Piping & Fabrication, LLC is the general mechanical contractor responsible for the preparation, assembly, and installation of the SHR system in the facility. Programming and installation procedures, including electrical design by Power System Engineering, Inc., will be managed on a day-to-day basis by Poppe. Other management Team members will also take lead positions in the project.

Production Manager, Matthew Quinn, will manage the shift leads and the energy center operators to ensure that the production process is running as intended with the new technology. Quinn will also oversee the evaluation and data collection acquired from the testing of the SHR system. Maintenance Manager, Travis Bolte, will oversee the Maintenance Coordinator and numerous Maintenance Technicians to ensure that the plant is running optimally. Bolte will be responsible for training Maintenance Technicians on the proper function of the SHR system. IntegroEnergy Group, Inc. has delivered a technology that is simple to maintain and operate. The team will ensure that maintenance during and after the project is completed on a routine schedule for the SHR system to operate at full capacity.

The goal of the project is to introduce a new and effective technology for use in the North Dakota renewable energy industry. To ensure that the project is successfully tested, HRE's team has set protocols and standard operating procedures critical to the functioning of an ethanol plant. The integration of the SHR system should be a seamless and straightforward process. Team members will be trained on how to operate the machinery. Quinn will provide calculations, analysis, and validation of the SHR system during the production process. As the SHR system is tested during the day-to-day function of the plant, Quinn will integrate data collection related to the system's performance such as natural gas usage, water usage, etc. into reports. HRE's team will evaluate the reports for the effectiveness of the SHR system. The goal is that the technology will successfully capture and recycle waste heat into steam production, allowing the plant to reduce the natural gas needed for process heat. The project is also expected to successfully resolve the plant's current steam limitation in winter months, which will allow HRE to increase ethanol production by an estimated 10 MMGY.

TIMETABLE

Hankinson Renewable Energy, LLC (HRE) developed the following timeline based on the identified objectives and activities for the proposed project. HRE's project team developed the schedule to keep the workflow on track and to set feasible deadlines with realistic project progress and deliverables.

Table 2 shows the Stack Heat Recovery (SHR) project timeline. Table 3 outlines and identifies project activities and milestones, as well as anticipated reporting activities should the project receive grant funding.

Table 3: SHR Project Timeline

Start Date	Completion Date	Activity
April 1, 2019	April 30, 2019	Project Approval
May 1, 2019	May 31, 2019	Project Kickoff
June 1, 2019	June 30, 2019	Construction Start
July 1, 2019	July 31, 2019	Construction Progress
July 15, 2019	July 31, 2019 – Submission	Status Report #1
August 1, 2019	August 31, 2019	Construction Progress
September 1, 2019	September 30, 2019	Construction Completion
October 1, 2019	October 31, 2019	Equipment Testing & Trials
October 15, 2019	October 31, 2019 – Submission	Status Report #2
November 1, 2019	November 30, 2019	Production and Process Evaluation
November 15, 2019	November 30, 2019- Submission	Final Report

Table 4: SHR Project Milestones and Reporting Schedule

Activity/Milestone	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov
Project Approval								
Project Kickoff								
Construction Start								
Construction Progress								
Status Report #1								
Construction Progress								
Construction Completion								
Equipment Testing & Trials								
Status Report #2								
Production Process & Evaluation								
Final Report								

BUDGET

Table 5: HRE's Stack Heat Recovery System Installation Project Budget

Project Associated Expense	NDIC's Share	Applicant's Share (Cash)	Applicant's Share (In-Kind)	Other Project Sponsor's Share
Mechanical Installation	$310,000	$1,335,000		
Equipment	$180,000	$690,141		
Electrical Installation	$10,000	$167,000		
Programming		$10,000		
20% Contingency		$540,428		
Subtotals	$500,000	$2,742,569		
Total Project Budget	**$3,242,569**			

Budget Justification

Mechanical Installation – The budget for the mechanical installation will cover the costs associated with hiring Par Piping & Fabrication, LLC as the general mechanical contractor. The Stack Heat Recovery (SHR) system has numerous components that must be assembled to exact specifications. Par Piping & Fabrication will install the equipment with oversight and collaboration with the equipment designer and engineer, IntegroEnergy. The mechanical installation is the highest cost associated with the project. The installation process includes installation of the equipment components, tie in of the SHR system with existing equipment, and ensuring that the system functions at full capacity.

Equipment – The equipment portion of the budget accounts for the elements that comprise the entire Stack Heat Recovery system designed and sold by IntegroEnergy. The system consists of a new and proprietary design, engineered with commercially available components with spare parts that are readily available. This equipment includes two tanks, five pumps, two fans, two heat exchangers, large ducting, and instrumentation. This SHR system technology improvement allows for energy integration leading to reduced natural gas and water usage, and ethanol production increase. IntegroEnergy Group, Inc.'s design will allow the plant to recycle heat otherwise lost into steam production used for plant operations.

Electrical Installation – The funds from the budget will be used to employ Power System Engineering, Inc. to assist with the design of the electrical engineering required to install the SHR system.

Programming – IntegroEnergy Group, Inc. designed the SHR system to use practical equipment for easy purchasing access and simple parts replacement. Despite the sophisticated and easy-to-operate design, the new technology requires proper integration into HRE's production process. Therefore, programming is necessary to synchronize the technology to measurement, production, data gathering, and analysis tools. HRE is not requesting programming costs as part of the grant award.

20% Contingency – HRE understands the potential variables that can impact project budgets. The plant has included a contingency to the budget to cover possible unexpected expenditures. HRE is not seeking funding from the NDIC for this portion of the budget. The plant will absorb the costs within this category as the company recognizes the need to secure additional financing for unforeseen project expenses.

CONFIDENTIAL INFORMATION

Hankinson Renewable Energy requests that certain operational and financial statistics remain confidential. Team members will provide calculations, analysis, and validation of the SHR system during the production process. These data points will be complied into status reports, both for reporting to the NDIC and for HRE's personal use. General information about the impact of the SHR on the plant's operations are not confidential, but specific operational and financial information should be treated as Confidential Business Information (CBI). The following details the information to be treated as CBI and provides the explanation for doing so.

a. HRE requests that certain operational and financial information be treated as confidential. This information includes specific information pertaining to total usage amounts, grind margin, inputs per gallons of ethanol, yields, and expense details. This includes:
    - Annual total input amounts
    - Amount of input per gallon of ethanol produced
    - Production yield, especially gallons of ethanol per bushel of corn
    - Cost of input per gallons of ethanol
    - Cost of input per unit
    - Netbacks for products

    This does not include overall changes in inputs or outputs as a percentage of change. For instance, we would not consider it CBI that natural gas usage decreased 10% or that ethanol production increased by 10% with the new equipment; however, we would like to keep the actual total usage of natural gas (mmBTU per year) and the usage per gallon of ethanol (BTU/gallon) as CBI.

b. HRE is a small business with competitors. We seek to protect specific plant input and financial information to keep our production statistics private. Providing exact data related to operational and financial internal practices compromises private business practices which makes our company a success. The release of this information could give our competitors an edge, impede our success as a business, or serve as a template for competitors to implement and impede on the proprietary nature of how the SHR system is being installed at HRE's plant. While information about overall production outputs such as ethanol and coproducts production are not confidential, when aligned with annual totals for inputs, our competitors can easily discern specific usage amounts per gallons of ethanol. Likewise, specific details about the usage of input per gallon of ethanol provides private operational data we do not want our competitors knowing. In addition, keeping the price per input unit private maintains the confidentiality of agreements we have with our input suppliers and our marketer (RPMG).

    Daily data collection related to the system's performance such as natural gas usage, water usage, etc. will be turned into reports. The overall and general efficiency and production growth will be readily apparent in status reports to the NDIC and can be presented as a percentage of changes to steam production, natural gas and make-up water decreases, and ethanol production increase. However, the specific usage amounts and annual totals as detailed above, along with comparative analysis from before the SHR system and after the installation, will be protected by HRE.

c. Hankinson does not release specific numerical production data for other ethanol plants to see. The production statistics, Guardian benchmarking data, and other vital information are kept within plant

boundaries and are not ascertainable by the general public or other ethanol producers. Moreover, HCP is not a cooperative or similar industry that shares production data with several shareholders.

d. HRE seeks to test the viability of the SHR system for personal plant improvement and for the overall efficiency and productivity of the North Dakota renewable energy industry. However, other ethanol entities that have a similar steam limit issue may use specific data points from the data or reports to improve their own production through the methods that functioned for HRE, which puts our plant at a competitive disadvantage. HRE wishes to share the new marketable technology in North Dakota, but does not wish to give the general public or other ethanol plants insight into specific production data through public status reports. The value in specific production processes is invaluable to HRE and must remain confidential and protected from similar industries. We believe displaying the success of the SHR system can be illustrated to the public and industry by showing improvements or input/output changes as a percentage, rather than disclosing HRE's specific operational data.

e. Hankinson Renewable Energy has internal controls to maintain the confidentiality of its operational and financial information, but does provide general information pertaining to its production outputs (ethanol and coproducts) and cash bids for corn. HRE will work directly with the NDIC to ensure the level of transparency and public disclosure required. For example, HRE can provide the NDIC REP reports on overall and general production efficiencies as a percentage, rather than providing exact amounts much natural gas was used, the exact make-up water savings, amount of ethanol produced, etc., if the NDIC would prefer. The status reports will provide an overview of the viability and efficiency of the Stack Heat Recovery system and its effectiveness for cost savings, efficiency improvements, and production growth. The NDIC will receive updates on progress and some numerical data to prove the usefulness of the SHR system and prove its value in North Dakota. The Principal Investigator and project managers will work with NDIC staff to discern which data can be protected in accordance with NDCC 54-63-02. Together, HRE and the NDIC can ensure that a project is transparent concerning overall goals and progress, while keeping critical business information confidential.

PATENTS/RIGHTS TO TECHNICAL DATA

The Stack Heat Recovery system is proprietary technology owned and patented by IntegroEnergy. IntegroEnergy will maintain the proprietary and patent rights of this technology.

Specific production and operational data obtained by Hankinson Renewable Energy during testing is business confidential information to be shared with IntegroEnergy at HRE's discretion. While information specific to the impact of the SHR system, such as steam production, natural gas and make-up water usage, and overall ethanol production, will be provided to IntegroEnergy, the disclosure of other operational data not directly impacted by the SHR system, (e.g. co-product yields and production, etc.) are at the discretion of HRE management.

January 11, 2019

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

Dear North Dakota Industrial Commission reviewers:

Local corn farmers like me help expand North Dakota's agricultural industry by doing business with value-added producers like ethanol plants such as Hankinson Renewable Energy, LLC (HRE). As a corn supplier for HRE, I support the plant's project that will improve production efficiencies and increase ethanol production. The plant's proposed project will mean additional demand for the corn I grow.

The ethanol market utilizes corn crops to produce value-added products like ethanol fuel, and coproducts distillers grains and corn oil. This maximizes the value of these crops in a way that is good for the environment through the production of cleaner fuels like ethanol, as well as helping sustain the state's agricultural economy through corn purchase from area farmers and production of high quality animal feed products for North Dakota livestock.

Hankinson Renewable Energy's proposed project would provide new high-value opportunities for corn products for the benefit of North Dakota. I urge you to take the plant's application into favorable consideration.

Sincerely,

Dave Muehler
Muehler Turkey Farms, Inc.
16450 Hwy 11
Hankinson, ND 58041

January 11, 2019

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

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Sincerely,

James Sedler

James Sedler, Producer
8435 170th Ave SE
Hankinson, ND 58041

GUARDIAN ENERGY

January 25, 2019

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

RE: Hankinson Renewable Energy, LLC's Renewable Energy Council Grant Application

Hankinson Renewable Energy, LLC (HRE) is applying for a $500,000 grant through the North Dakota Industrial Commission (NDIC) Renewable Energy Council grant program for a project to test new technology that will increase energy efficiency in the production process, as well as increase production of ethanol and coproducts at HRE's production facility located in Hankinson, ND.

As the Chief Financial Officer responsible for Hankinson Renewable Energy's business, I verify that this project will have matching private industry investment made by Hankinson Renewable Energy, LLC of over 50% of the total project budget.

Dodi Matti, CFO
Chief Financial Officer
Guardian Energy Management, LLC
4385 Fountain Hills Drive NE, Suite 301
Prior Lake, MN 55372

Collaboration. Scale. Excellence.

GUARDIAN ENERGY

January 16, 2019

To whom it may concern:

I verify that Hankinson Renewable Energy, LLC does not have an outstanding tax liability owed to the State of North Dakota or any of its political subdivisions.

Dodi Matti
Chief Financial Officer
Guardian Energy Management, LLC
4385 Fountain Hills Drive NE, Suite 301
Prior Lake, MN 55372
(952) 465-0229
dodi.matti@guardianNRG.com