EERC
Energy & Environmental Research Center

UNIVERSITY OF NORTH DAKOTA
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April 30, 2010

Ms. Karlene Fine
Executive Director
North Dakota Industrial Commission
ATTN: Renewable Energy Development Program
State Capitol – 14th Floor
600 East Boulevard Avenue, Department 405
Bismarck, ND 58505-0840

Dear Ms. Fine:

Subject: EERC Proposal No. 2010-0250 Entitled "G F Truss Plant Gasification System Redesign"

Enclosed please find an original and one copy of the proposal entitled "G F Truss Plant Gasification System Redesign." Also enclosed is the $100 application fee.

The Energy & Environmental Research Center (EERC) of the University of North Dakota is pleased to submit this proposal. The proposed cost of the project is estimated at $491,313. Of this amount, the EERC is requesting $245,656 from the North Dakota Industrial Commission (NDIC). The EERC will seek approval for cost share of $245,657 from the EERC–U.S. Department of Energy Northern Great Plains Water Consortium. The EERC is committed to completing the project as described in this proposal if NDIC makes the requested grant.

If you have any questions regarding this proposal, please contact me by phone at (701) 777-5013 or by e-mail at kleroux@undeerc.org.

Sincerely,

Kerryanne M.B. Leroux
Research Engineer

Approved by:

Dr. Gerald H. Groenewold, Director
Energy & Environmental Research Center

KMBL/jae

Enclosures

G F TRUSS PLANT GASIFICATION SYSTEM REDESIGN

EERC Proposal No. 2010-0250

Submitted to:

Karlene Fine

ATTN: Renewable Energy Development Program
North Dakota Industrial Commission
State Capitol – 14th Floor
600 East Boulevard Avenue, Department 405
Bismarck, ND 58505-0840

Amount of Request: $245,656
Total Amount of Proposed Project: $491,313
Duration of Project: 12 months

Submitted by:

Kerryanne M.B. Leroux
Darren D. Schmidt
William I. Wilson
Kristopher J. Jorgenson
Joshua J. Ziman

Energy & Environmental Research Center
University of North Dakota
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Kerryanne M.B. Leroux, Project Manager

Dr. Gerald H. Groenewold, Director
Energy & Environmental Research Center

April 2010

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G F TRUSS PLANT GASIFICATION SYSTEM REDESIGN

ABSTRACT

Objective

The main goal of the proposed project is to redesign the Energy & Environmental Research Center (EERC) gasification system at G F Truss Inc.'s plant in Grand Forks, North Dakota, in order to achieve improved uninterrupted system operation. The objectives to achieve this goal are improvement on system design to increase marketability of the technology, system assessment and environmental testing and reporting and presenting for dissemination of findings to garner investment interest.

Expected Results

Sustainable biomass electrical energy production with minimal environmental impact is the optimal outcome of the proposed project. With a goal of uninterrupted operation of and electricity generation, verification of project achievement would be consistent system operation and electricity generation at the G F Truss plant EERC gasification system. A secondary accomplishment would be an operational schematic for wastewater management.

Duration

The proposed project will be conducted over the course of 1 year from project start.

Total Project Cost

The cost for the proposed project is $491,313, with $245,656 requested from the North Dakota Industrial Commission Renewable Energy Program and $245,657 anticipated to be provided from the Northern Great Plains Water Consortium as matching funds.

Participants

The proposed project is made possible by the partnership between the EERC and G F Truss, as well as the U.S. Department of Energy-sponsored Northern Great Plains Water Consortium.

PROJECT DESCRIPTION/BACKGROUND

Objectives

The goal of the proposed project is to modify the existing Energy & Environmental Research Center (EERC) gasification system at the G F Truss plant, located in Grand Forks, North Dakota, such that uninterrupted operation and electricity generation can occur from biomass and/or coal with minimal environmental impact. This will be accomplished by completing the following objectives:

- Redesign the system to improve marketability of the technology.
- Perform system assessment and environmental testing.
- Report and present information to disseminate findings to garner investment interest.

Methodology

The proposed work will be conducted under the three tasks described below.

Task 1. Gasification System Redesign: System equipment and processing will be redesigned, procured/fabricated, and installed using lessons learned from operating other EERC gasification systems.

Currently, three EERC downdraft gasification systems have been installed for demonstration in North Dakota and Minnesota: G F Truss plant, Fond du Lac Band of Lake Superior Chippewa Reservation, and Northern Excellence Seed facility. The G F Truss system was the first demonstration of the technology using the Ankur gasifier and a combined tar and char removal system. A redesign of the gasifier was performed for the Fond du Lac system to combat feed flow issues. Redesign of the tar and char removal streams into two separate water loops was conducted for the Northern Excellence system.

The proposed project would incorporate further improvements to the small-scale distributed gasification technology discovered from operations on the Fond du Lac and Northern Excellence gasification systems. For example, separation of the tar and char removal system into a wet tar scrubber system and a dry char removal system instead of two wet streams could reduce water utilization and improve water quality within the system. A new design of the feed system and gasifier would improve

issues common to cofiring biomass and coal, increasing the applicability of the technology. A superior controls program has been identified, making automation possible and the system more marketable.

Task 2. System Testing and Evaluation: The redesigned system will be tested, and environmental testing will be performed to ensure significant improvements have been made.

The newly installed equipment will be evaluated for operability. Feedstock testing of biomass, coal, and biomass–coal will be conducted. Analyses will include, but not be limited to, syngas quality and sustainability, effectiveness of the syngas cleanup subsystem, and electrical generation efficiency. Travel to other EERC-installed demonstration gasification systems may occur for review purposes.

Additionally, testing will be conducted on the gasification system to evaluate system water quality. Economical gas cleaning at a scale suitable for distributed energy from gasification requires water scrubbing to remove tars and cooling the syngas for sufficient filtration prior to the engine. To minimize water consumption, the water is cooled and recycled. Although filters are currently in place to prevent tar buildup in the water loop, small particles containing regulated constituents (e.g., benzene, etc.) remain dissolved in the water stream, and concentrations can increase over time. Thus there is a potential to generate hazardous wastewater, which would then require specialized treatment. The proposed work will determine the concentration of hazardous constituents over time and identify a mitigation plan to avoid hazardous classification of the scrubber water for continued economic distributed energy generation.

Task 3. Dissemination of Results: Presentation of project findings will be conducted at regional and national conferences to further disseminate results and garner interest in North Dakota biomass distributive energy potential. A comprehensive final report detailing project results will also be generated and made available for distribution.

Anticipated Results

Sustainable biomass electrical energy production with minimal environmental impact is the optimal outcome of the proposed project. As stated previously, the goal is uninterrupted operation and electricity generation at the G F Truss plant–EERC gasification system. Verification of achievement will be consistent

system operation and electricity generation. A secondary accomplishment will be an operational schematic for wastewater management.

Facilities

The three EERC downdraft gasification systems installed in North Dakota and Minnesota demonstrate generation of electrical power via combustion of syngas in an internal combustion engine. Figure 1 shows the 100-kW downdraft gasifier installed at the G F Truss plant. The biomass gasification power generation system converts sawdust and wood waste from the building product plant into a combustible gas to produce heat and electricity. The second gasification system was installed by the EERC at the Fond du Lac Band of Lake Superior Chippewa Reservation in northeastern Minnesota adjacent to the city of Cloquet, Minnesota. Wood waste from forestry activities feeds the system for building heat. Figure 2 shows the third gasification system located at the Northern Excellence Seed facility in Williams, Minnesota. This system utilizes waste grass seed screenings for electricity generation. Please refer to the next section for information on EERC facilities.

Figure 1. EERC gasifier at G F Truss.

Figure 2. Northern Excellence Seed gasification power system.

Resources

Since its founding in 1949, the EERC has conducted research, testing, and evaluation of fuels, combustion and gasification technologies, emission control technologies, ash use and disposal, analytical methods, groundwater, waste-to-energy systems, and advanced environmental control systems.

The EERC has specific experience in the design, procurement, fabrication, installation, and testing of conventional and advanced process development systems. Over 340 scientists, engineers, technicians, and support staff are available at the EERC to address current problems and assess future needs. The research staff is equipped with state-of-the-art analytical and engineering facilities. The main EERC facilities, with 245,000 square feet of laboratory, technology demonstration facility, and office space, are located on the southeast corner of the University of North Dakota campus. Laboratory- and pilot-scale equipment is available for evaluating new fuels and assessing new emission control technologies. Analytical techniques and instrumentation are available for the characterization of solid, liquid, and gaseous materials. Thus the EERC can provide a total-system assessment of a wide variety of energy, enviromental and mineral resource research topics.

Techniques to Be Used, Their Availability, and Capability

Standard engineering practices will be used for equipment installation and system testing. Equipment that is not commercially available will be fabricated using proven engineered designs that have been utilized with success on similar systems. A statistical testing matrix will be designed and implemented for determining significant effects during evaluation of water loop quality within the gasification system.

Environmental and Economic Impacts While Project Is under Way

Minimal environmental impact is expected during gasification system testing, and other than the purchase of commercial equipment, project funds will be utilized for work and power production in North Dakota. Table 1 shows the low emissions typical of the system, for which permitting exists, and any wastewater generated during testing will be disposed of through the proper channels to ensure negligible impact environmentally. The project will fund North Dakota labor during its course, both for system testing as well as using North Dakota vendors for fabrication of equipment to generate North Dakota power.

Ultimate Technological and Economic Impacts

The long-term advantages of the proposed project will be the commercialization of distributive gasification in North Dakota, creating jobs and lowering costs for small businesses and rural communities.

Small distributive energy production is ideal for control of energy costs for rural communities or of waste expenses for small businesses. Propane and fuel oil, which are commonly used throughout rural North Dakota, can be expensive, with prices varying widely over time. Waste organic materials can be high in volume and seasonally intermittent, meaning inconsistent and high disposal fees. Coal and biomass are abundant natural resources in North Dakota, available at low, moderately consistent cost. Installation of small-scale distributive solid fuel energy systems would thus improve the economy of rural communities and small businesses.

Table 1. Expected Emissions

Pollutant, tons/yr	Engine	Charcoal Burner	Flare	Total Process
Particulate	0.01	0.6	0.0000	0.6
Sulfur Dioxide	2.3	0.04	Trace	2.3
Nitrogen Oxide	1.0	0.4	0.0002	1.3
Carbon Monoxide	0.6	1.0	0.0440	1.6

The addition of distributed power generation facilities in small businesses and rural communities also creates jobs for manufacture, fuel supply, and operation. Because biomass is more economical as a fuel in smaller quantities, a wide variety of waste products (e.g., wood waste, agricultural residues, grasses, etc.) become applicable fuel resources. However, availability of biomass resources is often seasonal, requiring large storage capacity or cofiring with coal for annual operation. Distributive biomass and coal systems allow for development of a biomass feedstock industry while enhancing/maintaining North Dakota's agriculture and coal industries.

Why the Project Is Needed

The proposed project will identify a path forward for commercialization of distributive biomass, coal, and cofired gasification. Although currently abundant in North Dakota, coal resources are not unlimited. Utilization of renewable fuels will extend the availability of fossil fuel resources and ensure North Dakota's position as an energy exporter in the future. Use of power generation technology that requires significantly less water than conventional coal-fired power plants is of national interest. At a time when the global energy industry is focusing on reducing its carbon footprint, biomass also provides the opportunity for increased energy production without increasing greenhouse gas emissions.

STANDARDS OF SUCCESS

Demonstrating a near-commercial technology will garner interest from potential investors willing to generate renewable industry in North Dakota, generating economic growth. Measurable deliverables include system operation for at least 48 uninterrupted hours, with consistent electricity generation from produced syngas during the uninterrupted testing period, and a defined operational plan to avoid generation of hazardous wastewater classification.

The closer the technology is to commercialization, the more attractive it is for investors to commercialize and manufacture, enhancing the renewable energy industry in North Dakota. At the current state of the gasification technology, two commercial companies and one rural community have installed demonstration systems. Small business owners, rural communities, and public organizations interested in lowering energy or waste costs would find biomass gasification attractive. The small scale of the EERC

system would provide the opportunity to produce energy for an industrial site, several public buildings, or a small community. The path to commercialization is expected to take 5–10 years.

Dissemination of project results will educate the public and private sector on the state of biomass gasification technology and spur interest in both commercializing the technology and establishing renewable feedstock collection and delivery infrastructure. A developed biomass feedstock industry in North Dakota for agricultural residues, grasses, or organic industrial waste would translate to increased income for farmers, rural landowners, and small businesses. The installation of power generation facilities in small businesses and rural communities lowers costs for sustained existence, maintaining existing jobs while providing more economical opportunity for expansion to create additional jobs, as well as creating new jobs for manufacture, fuel supply, and operation of gasification systems throughout North Dakota. National interest in a commercial distributive biomass energy system could also increase North Dakota's manufacturing industry.

BACKGROUND/QUALIFICIATIONS

The EERC is one of the world's major energy and environmental research organizations, providing access to an array of multidisciplined engineers and scientists. Many exciting renewable energy research, development, demonstration, and commercialization projects have been conducted using a variety of biomass types for residential, industrial, and utility power generation. This section details the EERC's qualifications for the proposed project.

Capabilities

The EERC has established working relationships with nearly 1100 clients in 51 countries and all 50 states, including federal and state agencies, universities, coal companies, utilities, research and development firms, equipment vendors, architecture and engineering firms, chemical companies, and agricultural products companies. The EERC emphasizes true working partnerships among private industry, government agencies, academic institutions, and the research community. The EERC also fosters cooperation among industry, government, and the local communities. These relationships involve contracts with individual entities, as well as contracts involving groups of entities participating in cooperative multiclient projects. Thus the EERC is committed to a partnership team approach for energy and environmental technologies.

The Centers for Renewable Energy and Biomass Utilization are a designated Center of Excellence located at the EERC. The Centers conduct critical research, development, demonstration, and commercial deployment of technologies utilizing biomass, wind, solar, geothermal, and hydroelectric energy sources. Under the Center for Biomass Utilization® (CBU®), the EERC offers the most comprehensive approach to biomass conversion research. Capabilities specific to the proposed project include:

- Characterization and analysis of any type of biomass, including wood residue, rice straw, switchgrass, wheat straw, forest and wood residues, agricultural residues, energy crops, and municipal solid waste.
- Assessment of biomass resources and determination of annual biomass tonnage available.
- Identification of feedstocks and long-term supply.
- Cost and benefit assessment: tax credits, emission credits, green power incentives, and fuel cost savings.
- Providing economic and technical assessment of efficiency of power and electricity, emissions, biomass handling, and ash behavior.

Expertise

All EERC projects have resulted in valuable information used by various federal, state, and municipal agencies and industrial clients to pursue financing, present projects for management or legislative review, negotiate rates with utilities, or provide public outreach. The EERC is a nonprofit organization that seeks the best solution for the client. The EERC is not affiliated with any specific corporation or required to promote technologies under development at the EERC. Examples of EERC reports are available upon request.

MANAGEMENT

The project team has 45 years of combined experience in renewable energy and economic development. Ms. Leroux will manage EERC project efforts, assisted by Mr. Darren D. Schmidt, Mr. William I. Wilson, Mr. Kristopher J. Jorgenson, and Mr. Joshua J. Ziman. Resumes for these individuals can be found in Appendix A.

Project Manager

Ms. Kerryanne M.B. Leroux, *Research Engineer:* Ms. Leroux holds M.S. and B.S. degrees in Chemical Engineering. Ms. Leroux has extensive experience researching renewable, alternative, and fossil energy markets and production. She has performed data, statistical, market, and economic analyses, as well as feasibility studies, for numerous renewable energies such as wind hybrid systems, gasification, fuel cells, energy storage, cogeneration facilities, biorefineries, biodiesel, ethanol, biomass, and hydrogen. Ms. Leroux has also provided technical support for water management efforts, including water/wastewater treatment and mitigation, through method and technology assessment, process data analyses, and statistical interpretation. Current efforts include process designs and demonstration systems for biomass products such as ammonia, bio-oil, and combined heat and power (CHP) via gasification.

Technical Support

Mr. Darren D. Schmidt, *Senior Research Advisor:* Mr. Schmidt is a Senior Research Advisor at the EERC, where he is responsible for securing and managing projects for industrial clients in the areas of biomass energy, distributed power systems, biomass gasification, combustion, microturbines (oil and gas), gas to liquids, hydrogen, emission control, fuel cells, energy efficiency, and fossil energy research. Primary technological innovations for commercial interests include microgasification power plants and low-Btu gas applications for microturbines. Mr. Schmidt holds a B.S. in mechanical engineering and is a registered professional engineer, a certified energy manager, and a certified green building engineer.

Mr. William "Jib" I. Wilson, *Research Specialist:* Mr. Wilson is a Research Specialist at the EERC, where he holds an A.S. in Electronic Engineering. His area of expertise includes gasification, microturbines, and energy efficiency and renewable energy applications in residential and commercial settings. Prior to his position at the EERC, he served as a Residential Project Program Manager for Maui Electric Company on the island of Maui, Hawaii. Because of his extensive background in real estate and residential building, Mr. Wilson was instrumental in bringing the U.S. Department of Energy's (DOE's) Energy Star® home standards to Hawaii and for convincing Hawaii's first builders and developers to make solar water heating a standard feature on all newly built homes.

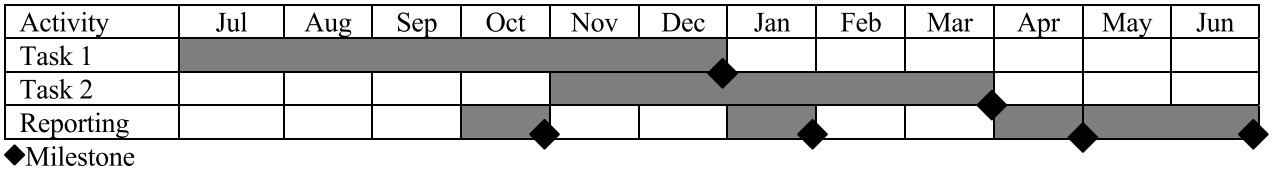
***Mr. Kristopher J. Jorgenson**, Research Engineer:* Mr. Jorgenson is a Research Engineer at the EERC, where he works with the Renewable Fuels Group in designing and developing power systems and processes for biomass gasification and conversion to heat, electricity, and syngas for potential conversion to fuel. He has a B.S. degree in Mechanical Engineering. Mr. Jorgenson has most recently been operating gasification equipment and assisted with testing of pilot systems.

***Mr. Joshua J. Ziman,** Research Engineer:* Mr. Ziman holds a B.S. degree in Chemical Engineering and is a Research Engineer at the EERC. His expertise includes process engineering, equipment diagnosis, and construction methods. Mr. Ziman also has experience in water treatment, emerging contaminants in drinking water, and anaerobic digestion. Prior to his position at the EERC, Mr. Ziman worked for Archer Daniels Midland, assisting in the management of capital expansion projects.

TIMETABLE

The proposed project will be conducted over the course of 1 year from project start. The anticipated schedule is shown below. The following milestones are marked:

- Tasks
  - Task 1. Gasification System Redesign – December 2010
  - Task 2. System Testing and Evaluation – March 2011
- Reporting
  - Progress Reports – Quarterly (October 2011, January 2011, April 2011)
  - Final Report and Presentations – June 2011



BUDGET

Project Associated Expense	NDIC's Share, $	Applicant's Share (cash), $	Applicant's Share (in-kind)	Other Project Sponsor's Share
Direct Costs	153,534	83,771		
Equipment	0	120,000		
Indirect Costs	92,122	41,886		
Total	**245,656**	**245,657**		

The cost for the proposed project is $491,313 with $245,656 requested from the NDIC Renewable Energy Program and $245,657 anticipated to be provided from the DOE-sponsored Northern Great Plains Water Consortium as matching funds. A more detailed breakdown of cost is provided in the subsequent budget notes. Table 2 shows equipment costs are approximately $120,000. About 3900 labor hours are estimated for due diligence on project tasks. EERC buildings, computer equipment, and administrative staff as well as support technical staff will be available for utilization by the project team as needed. Travel expenses for EERC personnel to review other gasification systems and to present final project results are also included in the budget estimate. A detailed budget and budget notes can be found in Appendix B. The letter of commitment can be found in Appendix C. Initiation of the proposed work is contingent upon the execution of a mutually negotiated agreement or modification to an existing agreement between our organizations.

Table 2. Equipment List for G F Truss Gasification System Redesign

Equipment	Cost, $
Gasifier	25,000
Water System	9,000
Ash System	6,500
Char Burner	11,000
Controls	8,500
Chipper	40,000
Conveyor	8,000
Misc.	12,000
Total	**120,000**

TAX LIABILITY

The EERC does not have an outstanding tax liability owed to the state of North Dakota or any of its political subdivisions.

CONFIDENTIAL INFORMATION

This proposal does not contain confidential information.

PATENTS/RIGHTS TO TECHNICAL DATA

The EERC Intellectual Property office will protect discoveries that could lead to the evolution of new intellectual property.

APPENDIX A

RESUMES OF KEY PERSONNEL

KERRYANNE M.B. LEROUX
Research Engineer
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
Phone: (701) 777-5013, Fax: (701) 777-5181, E-Mail: kleroux@undeerc.org

Principal Areas of Expertise

Ms. Leroux's principal areas of interest and expertise include renewable and alternative energy and chemicals market evaluation, technical feasibility, process design, pilot- and demonstration-scale testing, and economic analysis.

Qualifications

M.S., Chemical Engineering, University of North Dakota, 2001.
B.S., Chemical Engineering, University of North Dakota, 1999.

Professional Experience

2001–Present: Research Engineer, EERC, UND. Ms. Leroux has performed data, statistical, market, and economic analyses as well as feasibility studies for numerous renewable energy technologies, including wind hybrid systems, demonstration-scale gasification, fuel cells, energy storage, biomass cogeneration and combined heat and power facilities, Fischer–Tropsch fuels, pyrolysis, biodiesel, ethanol, hydrogen, and cellulosic chemicals and fuel with the Center for Biomass Utilization® (CBU®), the National Alternative Fuels Laboratory® (NAFL®), and the Plains Organization for Wind Energy Resources® (POWER®). She has provided support for water management efforts through method and technology assessment, process data analyses, and statistical interpretation with the Fernald Silo Waste-Processing and Waffle® projects and the Red River Water Management Consortium (RRWMC®). Ms. Leroux's responsibilities include serving as a principal investigator or project manager on assigned tasks; providing project support and guidance and regularly assessing activities and progress; effectively reporting results and conclusions of research activities to clients through technical reports, publications, papers, posters, and personal communication as contractually required; and collecting, reducing, analyzing, and interpreting data and ensuring quality control of personal work.

1999–2001: Graduate Research/Education, Department of Chemical Engineering, UND. Ms. Leroux's work on two-phase flow models for low-pressure systems continued scarce research of pressure gradient models for various regimes, including a deriving model and writing a simulation program for annular flow and identified parameters for significance of liquid vaporization and acceleration. She also revised an air/water simulation program for hydrogen pressure drop, accommodating NASA's interest, and altered parameters within a model applicable to all flow regimes for gradient estimation particular to stratified flow. In addition, she designed experiments for an industrial setting and performed statistical analysis of collected data.

Publications and Presentations

Has coauthored numerous professional publications.

DARREN D. SCHMIDT
Senior Research Advisor
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
Phone: (701) 777-5120, Fax: (701) 777-5181, E-Mail: dschmidt@undeerc.org

Principal Areas of Expertise

Mr. Schmidt's principal areas of interest and expertise include geologic CO_2 storage, enhanced gas production from coal, CO_2 enhanced oil production, associated gas utilization, distributed power systems, biomass gasification, combustion, microturbines, gas to liquids, hydrogen, emission control, fuel cells, energy efficiency, and Bakken shale research.

Qualifications

B.S., Mechanical Engineering, West Virginia University, 1994
Registered P.E.
Certified Energy Manager
Certified Green Building Engineer

Professional Experience

2008–Present: Senior Research Advisor, EERC, UND. Mr. Schmidt provides engineering, project management, and field services for oil- and gas-related projects at the EERC, which include CO_2 pilot injection and geologic storage research, enhanced gas production from coal, and Bakken shale research. Additionally, Mr. Schmidt is an advisor to distributed biomass gasification development and contributes to the organization's revenue through research proposals, publications, and intellectual property.

2006–Present: Consultant, Advanced Biomass Gasification Technologies, Grand Forks, North Dakota. Applied research in the area of biomass gasification has resulted in intellectual property for microgasification energy systems. Microgasification includes the generation of heat and electricity from biomass via gasification and firing of generators with low-Btu gas. Mr. Schmidt is the primary innovator and has sold technology rights to the EERC Foundation and Xethanol Corporation. Mr. Schmidt is working to develop the product for commercialization through a subsidiary, Advanced Biomass Gasification Technologies.

1998–2008: Research Manager, EERC, UND. Mr. Schmidt's responsibilities include securing research contracts, managing projects, and performing engineering tasks in the areas of cofiring and biomass power systems, including combustion, fluidized-bed, gasification, microturbine, and internal combustion engine generators; energy efficiency; ground-source heat pumps; hydrogen production from biomass; and researching the behavior of biomass in combustion systems relative to ash fouling and trace elements.

1994–1998: Mechanical Engineer III, Research Triangle Institute (RTI), Research Triangle Park, North Carolina. Mr. Schmidt's responsibilities included serving as project leader for a $3M Cooperative Agreement with the U.S. Environmental Protection Agency (EPA) to demonstrate

electricity production using a 1-MW wood gasification technology. The project involved engineering design, specification, purchase, fabrication, installation, and testing for a wood chip feed system; obtaining a North Carolina air quality permit; development of a computer program to interactively solve thermodynamics for drying; interaction with the EPA client, project subcontractors, and RTI project team; budget tracking and projecting; operation and testing of the power plant facility; preparing an 1-MW Waukesha engine generator set to burn low-Btu wood gas; and completion of technical reports for the EPA project monitor and for RTI management. Other activities at RTI included support of marketing activities and coauthoring publications.

Summer 1993: Internship, EERC, UND. Mr. Schmidt's responsibilities included operation of a pressurized drop-tube furnace to analyze coal ash deposition in large-scale utility boilers. Ash samples were scanned by an electron microscope, and data analysis techniques were used to characterize the coal ash. Other activities involved design and testing of an experimental coal slurry feed system for the drop-tube furnace and compiling reports on testing procedures and test results.

Summer 1992: Internship, Foster Wheeler Development Corporation, Livingston, New Jersey. Mr. Schmidt's responsibilities included a research project involving testing the first stage of a fluidized-bed coal gasification combined-cycle process. Duties included collecting and logging all process samples during a 2-week test run; analyzing data collected for all previous test runs to establish relationships between the data and the plant-operating conditions; and submitting internal reports to the supervising research professor to state conclusions.

Publications and Presentations
Has authored or coauthored numerous publications.

WILLIAM I. "JIB" WILSON IV
Research Specialist
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Principal Areas of Expertise

Mr. Wilson's principal areas of interest and expertise include environmental systems and energy conversion technologies.

Qualifications

Authorized Service Provider for Capstone MicroTurbine, Chatsworth, California, 2006
A.S., Electronic Engineering Technologies, Maui Community College, Kahului, Hawaii, 1998
Real Estate Securities and Syndication Institute, Carmel, California, 1979

Professional Experience

2006–Present: Research Specialist, EERC, UND. Mr. Wilson's work involves projects in the areas of environmental systems and energy conversion technologies. Responsibilities include preparing proposals, writing reports and papers, and presenting research findings as well as all aspects of hands-on field work. Specific examples include the following:

- Assisted project managers and principal investigators in obtaining data and results of operating microturbines on low-Btu oil field gas by installing and troubleshooting two 65-kW microturbines, designing test methods, and modifying and implementing tests and modifications, requiring knowledge of electronics, computer programming, and mechanics.
- Assisted in the construction, operation, and maintenance of sampling equipment, including mercury analytical instrumentation and particulate-sampling equipment.
- Setup, operation and troubleshooting of gasifier project at G F Truss Inc., requiring knowledge of electronics, plumbing, equipment repair and modification, and fabrication of new equipment for nonstandard applications.
- Prepared feasibility study for Hawaii developer wanting to demonstrate the economic viability of providing electricity for a 163-unit residential development using hydrogen fuel cells, creating the hydrogen from photovoltaics.

2005–2006: Technician, HB Sound & Light, Grand Forks, North Dakota. Mr. Wilson's responsibilities included assisting in commercial installations of multimedia systems, computer networks, and surveillance cameras. Repaired, maintained, and performed troubleshooting of Grand Forks Public Schools sound systems for the hearing impaired. Other duties included assisting in the setup and operation of concert sound and lighting systems.

1998–2004: Residential Program Manager, Maui Electric Company, Ltd (MECO), Kahului, Hawaii. Mr. Wilson's responsibilities included expanding the number of Residential Efficient Water Heating (REWH) technologies installed in homes throughout Maui County; meeting shareholder incentives, kW and kWh goals, and financial goals; retaining customers through the Demand Side Management Program; providing/assisting in monthly, semiannual, and annual

reports filed with the Public Utilities Commission; developing and maintaining cooperative relationships between community, industry, and state and local government to educate the public on energy efficiency to decrease Maui's dependency on fossil fuels. Achievements included the following:

- Increased the number of solar water heating (SWH) systems installed on new homes from 16% to over 40% in 6 years, averaging 22.5% increase per year.
- Developed and coordinated multidisciplinary contracts between homeowners, builders, developers, lenders, Fannie Mae, the U.S. Environmental Protection Agency (EPA), and other key county, state, federal, and private agency supervisors and staff personnel. Provided and or assisted in creating monthly, semiannual, and annual reports that are filed with the Public Utilities Commission and writing county and federal grants.
- Improved the way homes were being built by recruiting Hawaii's first builders and developers to make solar water heating a standard feature in all their new homes.
- Created and presented education seminars for Hawaii's Building Industry Association, Hawaii Association of Realtors, state and local lenders, and the Maui Contractor's Association's Annual Home Show.
- Assisted in creating Maui Electric's Commercial Solar Program.
- Contributed to the creation of the Solar Water Heating Test Center for Maui Community Colleges Sustainable Technology Program.
- Received the Outstanding Achievement Award – U.S. Department of Energy, Energy Star Homes Program –2002, 2003, and 2004.
- Recognized by the State of Hawaii's Department of Business, Economic Development, & Tourism for accomplishments with Maui's building industry.
- Best Progress Award – one of three National Awards, awarded by the U.S. Department of Energy.
- Researched and cowrote county and federal grants.
- Published in industry and local magazines.

1996–1998: Intern for Department of Defense Contract, Maui High-Performance Computing Center, Kihei, Hawaii. Mr. Wilson's responsibilities included assisting in the design and construct of an eight-node NT Cluster at the Maui High-Performance Computer Center for the Department of Defense and assist in writing Perl scripts.

1996–1998: Solar Inspector, Maui Electric Company, Ltd., Kahului, Hawaii. Mr. Wilson's responsibilities included verifying compliance of over 85 items in Maui Electric's solar water heating program's standards and specifications by inspecting installations done by participating contractors. Primary troubleshooter for customers complaining about the lack of hot water; assisted in troubleshooting the cause of high bill complaints.

1992–1997: Owner, Light and Sound Tech, Kihei, Hawaii. Mr. Wilson's responsibilities included working as a light and sound engineer for shows and productions for the entertainment community in the state of Hawaii. Created and maintained multiple light and sound contracts for numerous national and statewide performing arts, entertainment, and lighting and sound companies.

1983–1983: Principal Broker, ERA Pacific Land, Wailuku, Hawaii. Mr. Wilson's responsibilities included negotiated and processed sales contracts, leases, agreements, deeds, and title searches, etc., while managing day-to-day operations.

1983–1990: Real Estate Licensing Instructor, ERA Pacific Land dba Maui School of Real Estate, Wailuku, Hawaii. Mr. Wilson's responsibilities included instructing students for real estate mathematics for real estate licensing course on the island of Maui. Taught weekly classes as well as participated in class recruitment and real estate course tutoring.

Publications and Presentations

Has authored and coauthored numerous professional publications and symposium presentations on residential energy efficiency, construction, and finance.

KRIS J. JORGENSON
Research Engineer
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
Phone: (701) 777-5000, Fax: (701) 777-5181, E-Mail: kjorgenson@undeerc.org

Principal Areas of Expertise

Mr. Jorgenson's principal areas of interest and expertise include harnessing energy available from biomass sources and determining its suitability and cost-effectiveness and assisting with a variety of projects within the Renewable Fuels Group and Hydrogen Technology Group.

Qualifications

B.A., Mechanical Engineering, Mathematics Minor, University of North Dakota, 1999.
CAD Skills: Inventor, Mechanical Desktop, Unigraphics, and ProE.

Professional Experience

2009–Present: Research Engineer, EERC, UND. Mr. Jorgenson works with the development of biomass power systems and processes for the potential production of heat, electricity, fuels, and chemicals. He also has worked with hydrogen production products as well as hydrogen vehicle development with fuel cells. Specific responsibilities include designing processes and creating drawings for equipment related to specific products; providing engineering support on a variety of advanced pilot systems for testing and developing alternative fuels and energy forms; preparing research proposals; interpreting data; and writing reports and papers.

2006–2008: Engineer, Erskine Attachments Inc., Erskine, Minnesota. Mr. Jorgenson's responsibilities included development of new skid steer loader attachments to include designing, prototyping, testing, and releasing for production while supporting manufacturing.

2004–2005: 4-Stroke Snowmobile Engine CAD Designer, Arctic Cat Inc., Thief River Falls, Minnesota. Mr. Jorgenson's responsibilities included development of engine-related parts for the intake, exhaust, and cooling systems while resolving space constraints with multiple teams.

2003–Present: President, Omega Attachments Inc., McIntosh, Minnesota. Mr. Jorgenson and a partner started this company based on an invention they designed, prototyped, tested, and patented. The patent rights have since been sold.

2000–2003: Design/Application Engineer, Posi-Flate Butterfly Valves Inc., St. Paul, Minnesota. Mr. Jorgenson's responsibilities included designing, prototyping, testing, and releasing new products such as a series of pneumatic actuators (Torq-Mate) and a valve position monitor (Trak-Loc) while supporting sales and dealers with application type questions.

1999–2000: Associate Mechanical Engineer, Multifeeder Technology Inc., White Bear Lake, Minnesota. Mr. Jorgenson's responsibilities included working with high-performance friction feeders and accessories by integrating and installing with customer host equipment.

JOSHUA J. ZIMAN
Research Engineer
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
Phone: (701) 777-5420, Fax: (701) 777-5181, E-Mail: jziman@undeerc.org

Principal Areas of Expertise
Mr. Ziman's principal areas of interest and expertise include process engineering, equipment diagnosis, construction methods, and emerging contaminants.

Qualifications
B.S., Chemical Engineering, South Dakota School of Mines and Technology, 2007.

Professional Experience
2008–Present: Research Engineer, EERC, UND. Mr. Ziman's work focuses on a variety of issues related to energy and water sustainability. Specific responsibilities include review and interpretation of technical literature and data, preparation of technical reports and journal articles, presentations at national and international meetings and to clients, and preparation of proposals to government and commercial entities.

2007–2008: Production Assistant, Archer Daniels Midland, Lincoln, Nebraska. Mr. Ziman's responsibilities included assisting with daily plant operations, performing lockout tagout, filing confined space and hot work permits, directing equipment repair, solving production problems, supervising employees, dealing with employee performance issues, submitting plans, requesting capital for a $72,000 project, and implementing a $5.3 million project.

2006: Engineering Intern, Archer Daniels Midland, Velva, North Dakota. Mr. Ziman's responsibilities included assisting project engineers, performing equipment analysis, sizing equipment, and project supervision.

2005–2007: Research Assistant, Innovative Materials, Rapid City, South Dakota. Mr. Ziman's responsibilities included operating a scanning electron microscope, measuring particle-size distribution, using Daisy Lab data acquisition software, using a high-speed camera, revamping experimental procedures, rebuilding lab equipment, and contributing to technical presentations and reports.

APPENDIX B

BUDGET AND BUDGET NOTES

G F TRUSS PLANT GASIFICATION SYSTEM REDESIGN
NDIC RENEWABLE ENERGY COUNCIL
PROPOSED PROJECT START DATE: 7/1/10
EERC PROPOSAL #2010-0250

BUDGET

CATEGORY			TOTAL		NDIC REC SHARE		U.S. DOE SHARE	
LABOR		Rate	Hrs	Cost	Hrs	Cost	Hrs	Cost
Leroux, K.	Project Manager	$ 31.80	860	$ 27,348	685	$ 21,783	175	$ 5,565
Wilson, W.	Principal Investigator	$ 25.75	820	$ 21,115	685	$ 17,639	135	$ 3,476
Jorgenson, K.	Research Scientist/Engineer	$ 29.79	665	$ 19,810	500	$ 14,895	165	$ 4,915
Schmidt, D.	Research Scientist/Engineer	$ 52.49	80	$ 4,199	40	$ 2,100	40	$ 2,099
Ziman, J.	Research Scientist/Engineer	$ 28.08	600	$ 16,848	500	$ 14,040	100	$ 2,808
----------	Senior Management	$ 70.17	101	$ 7,087	-	$ -	101	$ 7,087
----------	Research Scientists/Engineers	$ 38.29	540	$ 20,677	300	$ 11,487	240	$ 9,190
----------	Research Technicians	$ 25.08	126	$ 3,160	-	$ -	126	$ 3,160
----------	Technology Dev. Mechanics	$ 29.23	120	$ 3,508	120	$ 3,508	-	$ -
----------	Technical Support Services	$ 20.02	20	$ 400	10	$ 200	10	$ 200
				$ 124,152		$ 85,652		$ 38,500
Escalation Above Base		5%		$ 6,208		$ 4,283		$ 1,925
TOTAL DIRECT HRS/SALARIES			3,932	$ 130,360	2,840	$ 89,935	1,092	$ 40,425
Fringe Benefits - % of Direct Labor - Staff		54.0%		$ 70,394		$ 48,565		$ 21,829
TOTAL FRINGE BENEFITS				$ 70,394		$ 48,565		$ 21,829
TOTAL LABOR				$ 200,754		$ 138,500		$ 62,254
OTHER DIRECT COSTS								
TRAVEL				$ 16,749		$ -		$ 16,749
EQUIPMENT > $5000				$ 120,000		$ -		$ 120,000
SUPPLIES				$ 9,000		$ 6,882		$ 2,118
COMMUNICATION - LONG DISTANCE & POSTAGE				$ 700		$ 350		$ 350
PRINTING & DUPLICATING				$ 600		$ 300		$ 300
OPERATING FEES & SVCS								
Natural Materials Analytical Res. Lab.				$ 1,096		$ 1,096		$ -
Fuels & Materials Research Lab.				$ 1,783		$ 1,783		$ -
Analytical Research Lab.				$ 1,877		$ 1,877		$ -
GC/MS Lab.				$ 1,281		$ 1,281		$ -
Graphics Support				$ 1,281		$ 1,281		$ -
Shop & Operations Support				$ 184		$ 184		$ -
Freight				$ 2,000		$ -		$ 2,000
TOTAL DIRECT COST				$ 357,305		$ 153,534		$ 203,771
FACILITIES & ADMIN. RATE - % OF MTDC			VAR	$ 134,008	60%	$ 92,122	50%	$ 41,886
TOTAL PROJECT COST - US DOLLARS				$ 491,313		$ 245,656		$ 245,657

Due to limitations within the University's accounting system, bolded budget line items represent how the University proposes, reports and accounts for expenses. Supplementary budget information, if provided, is for proposal evaluation.

G F TRUSS PLANT GASIFICATION SYSTEM REDESIGN
EERC PROPOSAL #2010-0250

BUDGET - TRAVEL

RATES USED TO CALCULATE ESTIMATED TRAVEL EXPENSES

DESTINATION	AIRFARE	PER MILE	LODGING	MEALS	CAR RENTAL	REGIST.
Unspecified Destination (USA)	$ 900	$ -	$ 200	$ 71	$ 85	$ 575
Williams, MN	$ -	$ 0.62	$ 80	$ 46	$ -	$ -

PURPOSE/DESTINATION	NUMBER OF TRIPS	NUMBER OF PEOPLE	NUMBER OF MILES	NUMBER OF DAYS	AIRFARE	MILEAGE	LODGING	MEALS	CAR RENTAL	MISC.	REGIST.	TOTAL
Conference/Unspecified Dest. (USA)	3	2	-	3	$ 5,400	$ -	$ 2,400	$ 1,278	$ 765	$ 360	$ 3,450	$ 13,653
Site Visit/Williams, MN	2	2	400	5	$ -	$ 496	$ 1,280	$ 920	$ -	$ 400	$ -	$ 3,096
TOTAL ESTIMATED TRAVEL												$ 16,749

G F TRUSS PLANT GASIFICATION SYSTEM REDESIGN
EERC PROPOSAL #2010-0250

DETAILED BUDGET - EQUIPMENT

Fabricated Equipment	$COST
Gasifier	$ 25,000
Water System	$ 9,000
Ash System	$ 6,500
Char Burner	$ 11,000
Controls	$ 8,500
Miscellaneous Piping and Steel	$ 12,000
Total Estimated Cost: Gasification System	$ 72,000
Other Equipment	
Chipper	$ 40,000
Conveyor	$ 8,000
	$ 48,000
Total Equipment	$ 120,000

G F TRUSS PLANT GASIFICATION SYSTEM REDESIGN
EERC PROPOSAL #2010-0250

DETAILED BUDGET - EERC RECHARGE CENTERS

			TOTAL
Natural Materials Analytical Res. Lab.	Rate	#	$Cost
XRFA	$174	6	$ 1,044
Subtotal			$ 1,044
Escalation		5%	$ 52
Total Natural Materials Analytical Res. Lab.			$ 1,096
Fuels & Materials Research Lab.	Rate	#	$Cost
BTU	$74	6	$ 444
Proximate Ultimate	$209	6	$ 1,254
Subtotal			$ 1,698
Escalation		5%	$ 85
Total Fuels & Materials Research Lab.			$ 1,783
Analytical Research Lab.	Rate	#	$Cost
Alkalinity	$25	6	$ 150
BOD	$49	6	$ 294
Chlorine	$54	6	$ 324
COD	$15	6	$ 90
pH	$15	6	$ 90
TC	$20	6	$ 120
TDS	$21	6	$ 126
TOC	$34	6	$ 204
TS	$28	6	$ 168
TSS	$8	6	$ 48
TVS	$29	6	$ 174
Subtotal			$ 1,788
Escalation		5%	$ 89
Total Analytical Research Lab.			$ 1,877
GC/MS Laboratory	Rate	#	$Cost
GC/MS (Hourly)	$61	20	$ 1,220
Subtotal			$ 1,220
Escalation		5%	$ 61
Total GC/MS Laboratory			$ 1,281
Graphics Support	Rate	#	$Cost
Graphics (hourly)	$61	20	$ 1,220
Subtotal			$ 1,220
Escalation		5%	$ 61
Total Graphics Support			$ 1,281
Shop & Operations Support	Rate	#	$Cost
Technical Development Hours	$1.46	120	$ 175
Subtotal			$ 175
Escalation		5%	$ 9
Total Shop & Operations Support			$ 184

BUDGET NOTES

ENERGY & ENVIRONMENTAL RESEARCH CENTER (EERC)

BACKGROUND

The EERC is an independently organized multidisciplinary research center within the University of North Dakota (UND). The EERC receives no appropriated funding from the state of North Dakota and is funded through federal and nonfederal grants, contracts, and other agreements. Although the EERC is not affiliated with any one academic department, university faculty may participate in a project, depending on the scope of work and expertise required to perform the project.

INTELLECTUAL PROPERTY

If federal funding is proposed as part of this project, the applicable federal intellectual property (IP) regulations may govern any resulting research agreement. In addition, in the event that IP with the potential to generate revenue to which the EERC is entitled is developed under this agreement, such IP, including rights, title, interest, and obligations, may be transferred to the EERC Foundation, a separate legal entity.

BUDGET INFORMATION

The proposed work will be done on a cost-reimbursable basis. The distribution of costs between budget categories (labor, travel, supplies, equipment, etc.) is for planning purposes only. The project manager may, as dictated by the needs of the work, incur costs in accordance with Office of Management and Budget (OMB) Circular A-21 found at www.whitehouse.gov/omb/circulars. If the Scope of Work (by task, if applicable) encompasses research activities which may be funded by one or more sponsors, then allowable project costs may be allocated at the Scope of Work or task level, as appropriate, to any or all of the funding sources. Financial reporting will be at the total-agreement level.

Escalation of labor and EERC recharge center rates is incorporated into the budget when a project's duration extends beyond the current fiscal year. Escalation is calculated by prorating an average annual increase over the anticipated life of the project.

The cost of this project is based on a specific start date indicated at the top of the EERC budget. Any delay in the start of this project may result in a budget increase. Budget category descriptions presented below are for informational purposes; some categories may not appear in the budget.

Salaries: The EERC employs administrative staff to provide required services for various direct and indirect support functions. Salary estimates are based on the scope of work and prior experience on projects of similar scope. The labor rate used for specifically identified personnel is the current hourly rate for that individual. The labor category rate is the current average rate of a personnel group with a similar job description. Salary costs incurred are based on direct hourly effort on the project. Faculty who work on this project will be paid an amount over their normal base salary, creating an overload which is subject to limitation in accordance with university policy. Costs for general support services such as contracts and intellectual property, accounting, human resources, purchasing, shipping/receiving, and clerical support of these functions are included in the EERC facilities and administrative cost rate.

Fringe Benefits: Fringe benefits consist of two components which are budgeted as a percentage of direct labor. The first component is a fixed percentage approved annually by the UND cognizant audit agency, the Department of Health and Human Services. This portion of the rate covers vacation, holiday, and sick leave (VSL) and is applied to direct labor for permanent staff eligible for VSL benefits. Only the actual approved rate will be charged to the project. The second component is estimated on the basis of historical data and is charged as actual expenses for items such as health, life, and unemployment insurance; social security; worker's compensation; and UND retirement contributions.

Travel: Travel is estimated on the basis of UND travel policies which can be found at www.und.edu/dept/accounts/policiesandprocedures.html. Estimates include General Services Administration (GSA) daily meal rates. Travel may include site visits, field work, meetings, and conference participation as indicated by the scope of work and/or budget.

Equipment: If equipment is budgeted, it is discussed in the text of the proposal and/or identified more specifically in the accompanying budget detail.

Supplies – Professional, Information Technology, and Miscellaneous: Supply and material estimates are based on prior experience and may include chemicals, gases, glassware, nuts, bolts, and piping. Computer supplies may include data storage, paper, memory, software, and toner cartridges. Maps, sample containers, minor equipment, signage, and safety supplies may be necessary as well as other organizational materials such as subscriptions, books, and reference materials. General purpose office supplies (pencils, pens, paper clips, staples, Post-it notes, etc.) are included in the facilities and administrative cost.

Subcontracts/Subrecipients: Not applicable.

Professional Fees/Services (consultants): Not applicable.

Other Direct Costs

Communications and Postage: Telephone, cell phone, and fax line charges are generally included in the facilities and administrative cost. Direct project costs may include line charges at remote locations, long-distance telephone, postage, and other data or document transportation costs.

Printing and Duplicating: Photocopy estimates are based on prior experience with similar projects. Page rates for various photocopiers are established annually by the university's duplicating center.

Food: Food expenditures for project meetings, workshops, and conferences where the primary purpose is dissemination of technical information may include costs of food, some of which may exceed the institutional limit.

Professional Development: Fees are for memberships in technical areas directly related to work on this project. Technical journals and newsletters received as a result of a membership are used throughout development and execution of the project by the research team.

Fees and Services – EERC Recharge Centers, Outside Labs, Freight: EERC recharge center rates for laboratory, analytical, graphics, and shop/operation fees are anticipated to be approved for use beginning July 1, 2009. Only the actual approved rates will be charged to the project.

Laboratory and analytical fees are charged on a per sample, hourly, or daily rate, depending on the analytical services performed. Additionally, laboratory analyses may be performed outside the university when necessary.

Graphics fees are based on an established per hour rate for production of such items as report figures, posters, and/or PowerPoint images for presentations, maps, schematics, Web site design, professional brochures, and photographs.

Shop and operation fees are for expenses directly associated with the operation of the pilot plant facility. These fees cover such items as training, personal safety (protective eyeglasses, boots, gloves), and physicals for pilot plant and shop personnel.

Freight expenditures generally occur for outgoing items and field sample shipments.

Facilities and Administrative Cost: Facilities and administrative (F&A) cost is calculated on modified total direct costs (MTDC). MTDC is defined as total direct costs less individual items of equipment in excess of $5000 and subawards in excess of the first $25,000 for each award. The F&A rate for commercial sponsors is 60%. This rate is based on costs that are not included in the federally approved rate, such as administrative costs that exceed the 26% federal cap and depreciation/use allowance on buildings and equipment purchased with federal dollars.

APPENDIX C

LETTER OF COMMITMENT

EERC
Energy & Environmental Research Center

UNIVERSITY OF NORTH DAKOTA
15 North 23rd Street — Stop 9018 / Grand Forks, ND 58202-9018 / Phone: (701) 777-5000 Fax: 777-5181
Web Site: www.undeerc.org

April 30, 2010

Ms. Karlene Fine
Executive Director
North Dakota Industrial Commission
ATTN: Renewable Energy Development Program
State Capitol – 14th Floor
600 East Boulevard Avenue, Department 405
Bismarck, ND 58505-0840

Dear Ms. Fine:

Subject: North Dakota Industrial Commission (NDIC) Renewable Energy Program

This letter is in regard to the cost share to be provided by the Energy & Environmental Research Center (EERC) for "G F Truss Plant Gasification System Redesign," as proposed to the NDIC Renewable Energy Program. The EERC will provide a match of $245,656, contingent upon award from one of its existing cooperative programs with the U.S. Department of Energy (DOE). A proposal for DOE funding will be submitted for utilization of FY2011 funds once an indication of NDIC's intent to fund the effort is received. The likelihood of funding is very strong, as the EERC's existing DOE cooperative agreement has been funded continuously since 1983.

If you have any further questions, please contact me by phone at (701) 777-5157 or e-mail at jharju@undeerc.org.

Sincerely,

John A. Harju
Associate Director for Research

JAH/jae