



June 18, 2008

Mr. William J. Huether  
State Energy Engineer  
North Dakota Department of Commerce  
Office of Renewable Energy & Energy Efficiency  
1600 East Century Avenue, Suite 2  
Bismarck, ND 58502-2057

Dear Mr. Huether:

Subject: Technical Reviewers' Comments R002-C

Thank you for sending the reviewers comments to me for the EERC proposal "Development of Economically Sustainable Distributed Power from Biomass Gasification for North Dakota." Enclosed please find a document providing additional information and clarifications on the proposal in response to the technical reviewers' comments.

I would also like to take this opportunity to let you know that I plan to attend the Renewable Energy Council meeting scheduled for 9:30 a.m. on July 8, 2008, in Bismarck, in order to address any further questions in person at that time.

If you have any questions or comments, please do not hesitate to contact me by phone at (701) 777-5261 or by e-mail at [dphassett@undeerc.org](mailto:dphassett@undeerc.org).

Sincerely,

Debra F. Rughoeft-Hassett  
Senior Research Advisor

DFPH/kal

Enclosure

## RESPONSE TO TECHNICAL REVIEWERS COMMENTS

### Development of Economically Sustainable Distributed Power from Biomass Gasification for North Dakota

Submitted by: Debra F. Pflughoeft-Hassett, Energy & Environmental Research Center

#### 1. OBJECTIVES

*Comment: Is this a marketing activity for a device of early technology which is obsolete and of questionable efficiency and which questionable is labor intensive at producing gas of questionable quality?*

Response: No. The EERC is developing new improved gasifiers, and the gasification system proposed for use is one of an improved design requiring limited labor under established operating conditions and that produces adequate quality gas for production of heat and power from variable biomass fuels. The EERC sees this effort as a step in the development and implementation of commercial biomass gasification in the United States, which is necessary to provide a platform for the longer-term renewable energy goals.

*Comment: Proposal should have addressed the NDIC/REC's goals more specifically. Overall, the objectives stated in the proposal align with the NDIC/REC's goals, but the proposal should have indicated how the NDIC/REC's goals and purposes would be met point by point. The NDIC/REC's first and third goals can be clearly identified in the proposal's objectives section, but the other goals need to be gleaned out of the remainder of the proposal.*

Response: The proposed project addresses NDIC/REC's goals as follows:

- NDIC/REC Goal 1: Demonstration of biomass gasification will generate information and knowledge that will support efforts to bring new renewable energy companies and industry investment to North Dakota through demonstrating North Dakota's commitment to renewable energy.
- NDIC/REC Goals 2 and 4: Demonstration of the existing gasifier will allow for an understanding of potential improvements to the system and for continued work with local industry to manufacture components for similar systems, resulting in preserving existing jobs and potentially creating new energy-related jobs and associated wealth and tax revenue.
- NDIC/REC Goal 3: Operation of the existing gasifier with various biomass fuels will provide educational opportunities for industry and the public about the benefits of and opportunities in biomass gasification for North Dakota.
- NDIC/REC Goal 5 and 6: Demonstration of biomass gasification is expected to facilitate the development and implementation of this technology in North Dakota by allowing potential users to have biomass fuels tested, learn about the operation of

gasification systems, and determine the potential for the technology for specific fuels and energy requirements. This also will facilitate maximization of the market potential for North Dakota renewable energy resources.

- NDIC/REC Goal 6 and 7: The associated equipment already installed on the gasification system proposed for use reduces char and wastewater production, which in turn reduces environmental concerns. As stated in the proposal, emission, by-product, and wastewater management plans will be prepared and made available to potential users, which will also reduce environmental concerns and help determine the market potential for the by-products produced.
- NDIC/REC Goal 8: This project will develop baseline information on biomass gasification, and that is a necessary step in the development and implementation of commercial biomass gasification in North Dakota and the United States. The effort is also expected to lead to additional projects; provide opportunities to develop advances in biomass gasification design, waste and by-product handling; and potentially lead to additional new ideas and activities relevant to North Dakota renewable energy.

## **2. ACHIEVABILITY**

*Comment: Too small a budget to produce meaningful results. Appears to be mainly information collecting.*

Response: The budget requested is relatively small but adequate to allow for testing of additional materials in the existing gasification system. No equipment or construction costs are anticipated as all equipment including those for heat and power generation is in place. The testing will provide the opportunity to collect additional information on gasifier operations that will facilitate development of process advancements, potential innovative uses for gasification systems in North Dakota, and the education of industry and the public.

## **3. METHODOLOGY**

*Comment: This is routine testing that has been conducted by many other organizations.*

Response: The EERC and others have demonstrated biomass gasification, but biomass gasification has not yet reached full commercial potential, and the type of work proposed allows for the demonstration of multiple biomass fuels, which is an important step in the development and implementation of commercial biomass gasification in North Dakota and the United States.

## **4. CONTRIBUTION**

*Comment: This is an old design of gasifier with some new updates. Industry is not likely to favor procurement of this equipment as newer concepts with much more advanced features are producing a high quality of gas that is producing desirable liquid fuels.*

Response: No equipment or construction costs are anticipated as all equipment, including those for heat and power generation, is in place. The gasifier is of an updated design and reduces char

and wastewater production. In order to advance the use of gasification, this project will focus on the production of synthetic gas for heat and power generation. This demonstration will potentially contribute to the overall data and experience information base that will advance the utilization of biomass gasification for heat and power as well as for the production of liquid fuels that are still in the developmental stages. The EERC will follow the development of biomass gasification for liquid fuel production and will continue to work with interested parties to utilize North Dakota renewable resources for maximum benefit.

*Comment: Gasification technology isn't new technology from a scientific perspective. However, the further development of gasification technology with respect to biomass resources prevalent in North Dakota is supported by this reviewer.*

Response: The reviewer is correct that gasification is not a new technology, but the EERC believes that the further development and demonstration of biomass gasification will be valuable to North Dakota in maximizing the potential of renewable resources.

**5. AWARENESS**

No comments to address.

**6. BACKGROUND**

No comments to address.

**7. PROJECT MANAGEMENT**

No comments to address.

**8. EQUIPMENT PURCHASE**

No comment to address.

**9. FACILITIES**

No comments to address.

**10. BUDGET**

*Comment: This is nonexceptional funding to promote a nonexceptional gasifier.*

Response: The budget requested is relatively small but adequate to allow for testing of additional materials in the existing gasification system. It is expected that the gasifier proposed for use in this project has the potential to be commercially used in multiple settings with multiple biomass fuels in North Dakota and the region. Demonstrating the usefulness of the system is necessary to move gasification technology into commercial use in North Dakota. Additionally, the testing will provide the opportunity to collect additional information on gasifier operations that will facilitate

development of process advancements and potential innovative uses for gasification systems in North Dakota.

**OVERALL COMMENTS AND RECOMMENDATION:**

*Comment: The choice of a small scale gasifier to process abundant raw material for a useful purpose is an excellent idea. The problem is the choice of candidate gasifier and the use that the resultant gas is employed in. There is an urgent need for rural North Dakota communities to be able to generate their own liquid fuel from local resources. A small scale gasifier can be an important component to solving this problem. Processes that convert syngas to liquid fuel require exceptionally clean gas in order not to poison catalysts, or in some cases bacteria, employed in the chemical conversion process.*

Response: As stated earlier, the gasifier is of an updated design and reduces char and wastewater production. In order to advance the use of gasification, this project will focus on the production of synthetic gas for heat and power generation. This demonstration will potentially contribute to the overall data and experience information base that will advance the utilization of biomass gasification for heat and power as well as for production of liquid fuels, which is still in the developmental stages. The EERC will follow the development of biomass gasification for liquid fuel production and will continue to work with interested parties to utilize North Dakota renewable resources for maximum benefit.