INFORMATION SHEET
RENEWABLE DEVELOPMENT FUND FROM XCEL ENERGY

Investing in Renewable Energy

BIOMASS DEMONSTRATION PLANT AT CENTRAL MINNESOTA ETHANOL COOPERATIVE

Executive Summary

The goal of the project was for Central Minnesota Ethanol Cooperative (CMEC) to gasify wood waste to generate electricity and heat. The project was intended to help the ethanol plant meet air emission requirements, reduce natural gas costs for drying distillers' grain and generate renewable electric energy. However, technical problems resulted in CMEC ending the project to pursue other energy alternatives.

Project Description

CMEC was to use synthetic gas produced from the gasification of wood waste to fuel a 959 kW generator. The electric energy produced from the generator was to be sold to Xcel Energy. In addition, heat generated from the gasifier would offset natural gas used during ethanol production at CMEC's plant. Project construction was substantially completed in the fall of 2006; however, the gasifier operated at a reduced capacity and failed to pass commissioning tests because the down-draft design could not handle impurities from the wood feedstock. Though CMEC attempted to improve the gasifier's capacity through design and operational modifications, in 2010 the Minnesota Pollution Control Agency changed permitting requirements which prevented the heat to be used to dry the distillers grain. Additional redesign costs and the inability to offset plant heat changed the economic model and CMEC determined that it was more feasible to pursue other alternatives to meet the plant's energy requirements.

Project Timeline

- By June 2006 all major construction was completed with the turbine in place, but the gasifier could not operate at full capacity.
- June 2006 to July 2008 involved redesign and operational strategies to remove impurities in the producer gas to allow the gasifier to operate at its full capacity.
- July 2008 to August 2010 there was mediation and arbitration to resolve contractual differences between CMEC and project suppliers
- August 2010 to March 2011 CMEC evaluated project options and concluded that the gasifier would need to be reconfiguered to operate as an up-draft gasifier.

Grantee: Central Minnesota Ethanol Cooperative
Project Dates: 10/12/2005 – 3/12/2011
RDF Funding Cycle: 2
Project Funding: $400,000 RDF Grant (Total project cost $18,462,472)
Project ID: EP-44
RDF Mission: To increase the market penetration of renewable electric energy projects and companies, and support emerging renewable electric technology through research and development beneficial to Minnesota and Xcel Energy's electric customers.

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Lessons Learned

The Renewable Development Fund (RDF) program has allowed contract extensions and design modifications to give project sponsors every opportunity to be successful. RDF projects inherently have a certain level of risk due to the nature of new technology and concepts that may be the first commercial application. However, as is the case with this project, changes can add several years to a project and even result in a reassessment of its merits. Gasification and wood biomass are not new concepts and therefore the initial risk assessment for this project was low. In this case, a down-draft gasifier was initially designed, whereby later studies by CMEC consultants determined that an up-draft gasifier would be a more appropriate gasifier design for the wood feed stock.

An indefinite additional amount of time and funding would have been required to perform a re-design, which would not have served the project well. Therefore, the project was terminated which enabled RDF funds to be available for initiatives that are ready to move forward. The project is eligible for future funding if design challenges can be resolved.

Usefulness of Findings

Downdraft gasifiers can achieve efficiencies above 85 percent and produce a gas with less tar, but with some particulates, which is more suitable for use in gas engines. Updraft gasifiers tolerate higher ash content, higher moisture content and greater size variation in the fuel as to produce a gas more suitable with some thermal applications. Gasifier applications where fuel composition can vary may be better served by forgoing the efficiency of a downdraft design for the fuel flexibility provided by an updraft design

Outcomes

- Regulatory changes that eliminated the ability to hedge against natural gas prices altered the economic model and project feasibility.
- The unused $1.6 million from the CMEC grant award will be available for future RDF projects.
- The requirement for RDF projects to be completed within five years was incorporated into the fourth RDF funding cycle.

RDF Mission:

Replace with new mission statement: To increase the market penetration of renewable electric energy projects and companies, and support emerging renewable electric technology through research and development beneficial to Minnesota and Xcel Energy's electric customers.