

**Environment and Natural Resources Trust Fund  
2011-2012 Request for Proposals (RFP)**

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**LCCMR ID: 157-F3+4**

**Project Title:** Optimizing Biogas' Role in Meeting Minnesota's Energy Goals

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**Category:** F3+4. Renewable Energy

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**Total Project Budget:** \$ \$484,400

**Proposed Project Time Period for the Funding Requested:** 2 yrs, July 2011 - June 2013

**Other Non-State Funds:** \$ 0

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**Summary:**

Remove market, technical and policy barriers for Minnesota to benefit from biogas's full economic and environmental potential. Despite past investments in anaerobic digestion R & D projects, barriers to widespread adoption remain.

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**Name:** Amanda Bilek

**Sponsoring Organization:** Great Plains Institute

**Address:** 2801 21st Avenue S, Ste 220  
Minneapolis MN 55407

**Telephone Number:** 612-278-7118

**Email:** abilek@gpisd

**Web Address:** www.gpisd.net

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**Location**

**Region:** Statewide

**Ecological Section:** Statewide

**County Name:** Statewide

**City / Township:**

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<input type="checkbox"/> Funding Priorities	<input type="checkbox"/> Multiple Benefits	<input type="checkbox"/> Outcomes	<input type="checkbox"/> Knowledge Base
<input type="checkbox"/> Extent of Impact	<input type="checkbox"/> Innovation	<input type="checkbox"/> Scientific/Tech Basis	<input type="checkbox"/> Urgency
<input type="checkbox"/> Capacity Readiness	<input type="checkbox"/> Leverage	<input type="checkbox"/> Employment	<input type="checkbox"/> TOTAL <input type="checkbox"/> %

**PROJECT TITLE:** Optimizing Biogas' Role in Meeting MN's Energy Goals

**I. PROJECT STATEMENT**

**Opportunity:** Anaerobic digestion of organic “wastes” from dairy, swine, poultry and beef operations, food processing and wastewater treatment plants promises multiple benefits, including: renewable electricity, synthetic natural gas, fertilizer, carbon and/or renewable energy credits, odor control and significant reductions in methane emissions, a greenhouse gas with 22 times more heat-trapping power than carbon dioxide. A 2009 NASA study found that the third largest contributing factor to atmospheric warming is livestock that emit methane. The precise size of the opportunity for biogas in Minnesota is hard to estimate because good data does not yet exist for some likely feedstocks, such as cheese whey and urban organic wastes.

- Conservatively, just the manure from ~7 million dairy cows and hogs could yield 17 billion cubic feet of biogas, approximately 3% of MN's electricity or 4% of natural gas.

**Problem:** Despite Minnesota's past investments in anaerobic digestion R&D projects, barriers to its widespread adoption remain. These barriers include:

- Lack of up-to-date information about feedstock location, cost, and availability;
- Poor understanding of the feedstock ratios that can optimize biogas production;
- Lack of awareness about new business models successfully used elsewhere; and
- A policy environment geared toward electricity production when that may not be the highest, best use of the biogas.

***The goal of this project is to remove these remaining market, technical and policy barriers so that Minnesota can benefit from biogas's full economic and environmental potential.***

**II. DESCRIPTION OF PROJECT ACTIVITIES**

**Activity 1: Improve market information to maximize biogas production.**

**Budget: \$237,900**

The project team will survey all potential co-digestion feedstocks in Minnesota to determine location, volume and cost; and will then analyze commercial experience and research globally to identify feedstock combinations that yield optimal gas output and determine priority feedstock ratios for laboratory testing.

<b>Outcome</b>	<b>Completion Date</b>
Conduct laboratory testing of potential biogas feedstocks (cheese whey, food processing waste and crop residues) to determine maximum biogas potential from different feedstock mixes.	<b>August, 2012</b>

**Activity 2: Address lack of geographic information to increase projects. Budget: \$138,900**

The Minnesota Geospatial Information Center (MnGeo) and the project team will develop a GIS-based, interactive map that will help digester developers of all kinds identify optimal project sites based on proximity to the right mix of feedstocks and to local users of the resulting electricity and synthetic natural gas. GIS map layers would include, but not limited to:

- Co-digestion feedstock locations, volumes and costs;
- Livestock operations (type, size and biogas potential from manure digestion);
- Local utilities, including location of three-phase and single-phase electrical lines and injection points in the natural gas infrastructure;

- Industrial and commercial natural gas users; and
- Farm equipment suppliers for anaerobic digestion technologies (pumps, agitators, augers, etc.).

Outcome	Completion Date
Resolve key technical and market barriers with new multi-layer GIS anaerobic digester project siting tool available at <a href="http://www.mnbiogas.org">www.mnbiogas.org</a> .	August, 2012

**Activity 3: Identify policy gaps: create conditions for success. Budget: \$60,060**

Experience in other states and countries highlights the importance of having the right public policies in place. Minnesota has some policies in place (renewable electricity standard, net metering, production incentive), but these have proven insufficient to stimulate a robust industry. A diverse biogas advisory group with knowledge of key barriers to anaerobic digester expansion will draw on the experience of other states and countries to develop consensus policy recommendations that will accelerate digester development in Minnesota.

Outcome	Completion Date
Address biogas policy barriers with a set of consensus policy recommendations from advisory group representing government, industry, academia and the environmental community.	September, 2012

**Activity 4: Outreach, education and dissemination of results. Budget: \$47,540**

The project team and advisory group members will develop a multi-pronged outreach strategy to ensure all relevant interests become aware of technical tools developed through this project.

Outcome	Completion Date
Increase in the number and success of digesters by educating key audiences about the policies and technical tools from this project.	September, 2012

**III. PROJECT STRATEGY**

**A. Project Team/Partners**

Partners receiving ENRTF appropriation: Great Plains Institute (project management, GIS data collection and coordination, web and policy development), Minnesota Geospatial Information Office (develop GIS application), MN Agri-Growth Council (agriculture and food industry outreach), Biobusiness Alliance of Minnesota (business and market development) University of Minnesota, Dept. of Bioproducts and Biosystems Engineering (feedstock research).

Partners contributing resources: All partners requesting an appropriation from the ENRTF will contribute in-kind resources. Additional partners contributing resources include the Agricultural Utilization Research Institute (feedstock research) and the MN Department of Agriculture (data collection and project outreach).

**B. Timeline Requirements**

Project will be conducted over a two year period to allow sufficient time to develop technical resources and to conduct outreach and education on technical resources.

**C. Long-Term Strategy and Future Funding Needs**

Establish a policy framework that stimulates a world-class digester industry that can help MN achieve its statutory renewable energy and climate goals, and result in a self-sufficient industry.

**Optimizing Biogas' Role in Meeting MN's Energy Goals  
2011-2012 Detailed Project Budget**

**IV. TOTAL TRUST FUND REQUEST BUDGET: \$484,400 2 years**

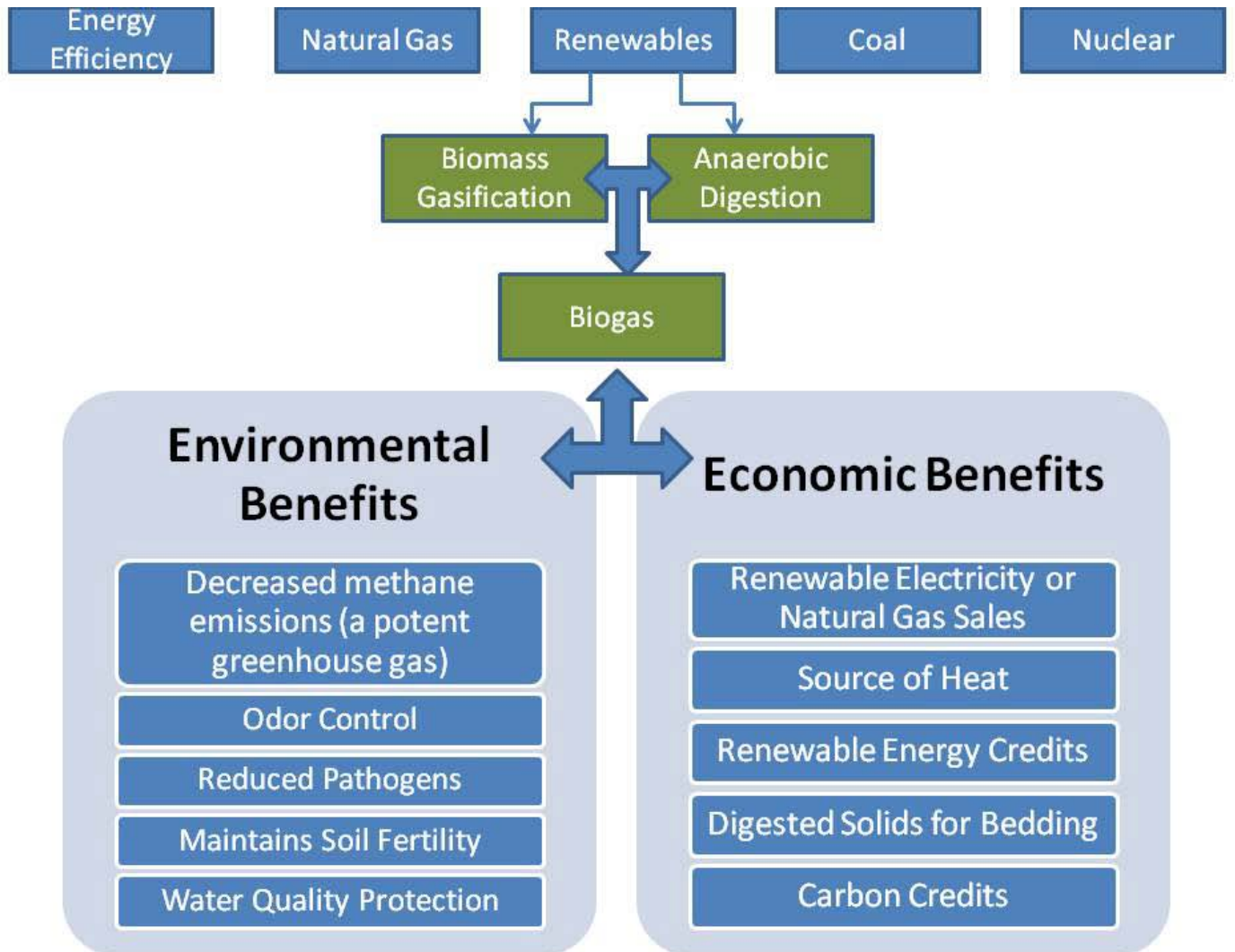
<b>BUDGET ITEM</b>	<b>AMOUNT</b>
<b>Personnel</b>	
Project manager, Great Plains Institute, manage project outcomes, coordinate policy development and project outreach, (40% FTE): Two-year position, 40% of salary, 40% of benefits	\$ 42,000
Policy development and project outreach, Great Plains Institute, (5% FTE): Two-year position, 5% of salary, 5% of benefits	\$ 6,500
GIS project coordinator, Great Plains Institute, (17.5% FTE): Two-year position, 17.5% of salary, 17.5% of benefits	\$ 17,200
Communications coordinator, Great Plains Institute, report production and website development (17.5% FTE): Two-year position, 17.5 % of salary, 17.5% of benefits	\$ 16,400
Research and data collection, Great Plains Institute, collect data points for GIS map (20% FTE): One-year position, 20% of salary, 20% of benefits	\$ 8,600
<b>Contracts</b>	
website development contract: contractor yet to be identified but will provide website architecture, template design and web code construction	\$ 15,000
Biobusiness Alliance of Minnesota: Identify and foster business development opportunities and leverage international technology connections.	\$ 60,000
Minnesota Geospatial Information Office (MnGeo): design and develop multi-layer GIS anaerobic digester project siting tool.	\$ 78,600
University of Minnesota Department of Bioproducts and Biosystems Engineering: collect and review existing co-digestion feedstock ratios to determine needed laboratory testing. Conduct laboratory experiments.	\$ 230,000
Minnesota Agri-Growth Council: outreach to agricultural and food industry in order to provide feedstock data from specific processing facilities.	\$ 3,000
<b>Travel:</b> In-state travel for Great Plains Institute staff. Mileage estimate based on 10 meetings and project dissemination opportunities over two-year project (200 miles per meeting x.55cents a mile = \$1100). Remaining is meal per diem and lodging for project staff.	\$ 3,100
<b>Printing/material production:</b> Printed final policy report (100 copies), printed GIS user guide (300 copies) and project factsheets (4 factsheets x 500 copies). Printing estimates based on past report production costs.	\$ 4,000
<b>TOTAL ENVIRONMENT &amp; NATURAL RESOURCES TRUST FUND \$ REQUEST</b>	\$ 484,400

**V. OTHER FUNDS**

<b>SOURCE OF FUNDS</b>	<b>AMOUNT</b>	<b>Status</b>
<b>In-kind Services During Project Period:</b>		
Great Plains Institute: process facilitation and policy development.	\$ 21,000	Secured
Minnesota Department of Agriculture: data collection and project outreach.	\$ 1,000	Secured
Minnesota Agri-Growth Council: membership outreach to assist with data collection, policy development and project outreach assistance.	\$ 6,000	Secured
Biobusiness Alliance of Minnesota: International technology and industry connections, business model development.	\$ 30,000	Secured
University of Minnesota, Department of Bioproducts and Biosystems Engineering: additional staff who will provide support and resources to the project.	\$ 30,000	Secured
<b>Funding History:</b> Energy Foundation, 2009-2010. Grant to develop a research paper to better understand barriers to anaerobic digestion project development.	\$ 28,000	Secured

## Optimizing Biogas' Role in Meeting MN's Energy Goals

There are a limited number of options for meeting Minnesota's renewable energy and climate goals, and biogas has the potential to make significant contributions to both. There are two ways to produce biogas: biomass gasification and anaerobic digestion. Both are important, but this project focuses on the latter. Anaerobic digestion is a technology that holds multiple economic and environmental benefits.



Country/State	Number of Anaerobic Digesters	Total Energy Production
Germany	~4,000	413,913 MW
Austria	294	21,417 MW
Wisconsin	24	3625 MW
New York	17	1107 MW
California	16	1503 MW
Pennsylvania	15	719 MW
Minnesota	5	177 MW

## Optimizing Biogas' Role in Meeting MN's Energy Goals

### Organization Description

The Great Plains Institute (GPI) is a non-partisan non-profit corporation based in Minneapolis, serving 10 Midwestern states and the province of Manitoba. The Institute brings together key public and private leaders to identify and implement policies, technologies, research and educational efforts that will accelerate the transition to a renewable and low-carbon energy system, and a society that is economically, environmentally and socially sustainable and prosperous over generations.

Our core competency is to foster consensus, then action, on critical energy issues. We help broad and diverse stakeholders reach agreements on difficult policy and technology issues. We then work with elected officials and others to translate that consensus into new public policies, accelerated technology deployment, research efforts and educational campaigns.

For example, in June of 2007, a GPI-led stakeholder group called Powering the Plains released the region's first consensus-based 50-year Energy Transition Roadmap for achieving a renewable and low-carbon energy economy. The Midwestern Governors Association, GPI, and its partners then parlayed this Roadmap into aggressive energy and climate accords signed by ten Midwestern governors and the premier of Manitoba in November 2007:

[www.midwesterngovernors.org](http://www.midwesterngovernors.org) and [www.midwesternaccord.org](http://www.midwesternaccord.org). The Institute is now working with the Midwestern Governors Association, the Midwestern Legislative Conference, the Corporation for a Skilled Workforce, the Organization of MISO states, and companies and environmental groups across the region to implement these agreements.

### Project Manager Qualifications

This project will be led by Amanda Bilek, an energy policy specialist with the Great Plains Institute. Amanda was formerly at the Minnesota Project where she developed deep expertise on anaerobic digester technology and valuable industry connections during her six-year tenure. Amanda worked with a project team to study the economics, impacts on soil quality, and potential of weed seed destruction from Minnesota's first on-farm digester at the Haubenschild dairy farm. Ms. Bilek participated in a research project at the Haubenschild farm testing fuel cell technology as an alternative generation option for biogas utilization. And her project work and coordination helped establish one of Minnesota's five on-farm digesters through a 2005 LCCMR appropriation to implement pilot digester technology at a mid-sized dairy farm in Minnesota. She has also authored • and coordinated development of • several digester reports, factsheets and web resources. Amanda graduated from the University of St. Thomas in 2001 with degrees in political science and environmental studies, and grew up on a diversified crop and livestock farm in Wadena County, Minnesota.

Additional management and oversight will be provided by Brendan Jordan, manager of the Great Plains Institute's Next Generation BioEnergy Program.