# Environment and Natural Resources Trust Fund
# 2015 Request for Proposals (RFP)

**Project Title:** **ENRTF ID:** **106-E**

Reducing Land Applied Agricultural Waste in SE Minnesota

**Category:** E. Air Quality, Climate Change, and Renewable Energy

**Total Project Budget: $** 504,385

**Proposed Project Time Period for the Funding Requested:** 3 years, July 2015 - June 2018

**Summary:**

Using proven technology, project will process organic waste from Whitewater/Root River region in a regional anaerobic digester. Most of these materials are currently land applied and threaten water quality.

**Name:** Ray Davy

**Sponsoring Organization:** Agri-Waste Energy Operations

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St. Paul MN 55113

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**Web Address**

**Location**

**Region:** SE

**County Name:** Fillmore, Houston, Olmsted, Winona

**City / Township:**

**Alternate Text for Visual:**

Process flow for regional AD project and map of karst features and sinkhole probability in SE MN

| | | | |
|---|---|---|---|
| _____ Funding Priorities | _____ Multiple Benefits | _____ Outcomes | _____ Knowledge Base |
| _____ Extent of Impact | _____ Innovation | _____ Scientific/Tech Basis | _____ Urgency |
| _____ Capacity Readiness | _____ Leverage | | _____ TOTAL |

**PROJECT TITLE: Reducing Land Applied Agricultural Waste in SE Minnesota**

## I. PROJECT STATEMENT

The Whitewater/Root River watersheds have runoff from over application of manure and commercial fertilizer. The unique karst geology of the region presents an additional challenge to protect water resources. Due to the concentration of large dairy, hog, and turkey operations and proximity to a large metropolitan area, a significant opportunity exists to develop an anaerobic digestion project that will process local nutrient rich waste streams in a regional anaerobic digester facility – using proven technology - to produce Renewable Natural Gas and Recovered Crop Nutrients.

This proposed project is modeled on a similar project, the "Renville Renewable Energy Project" that is currently undergoing state permitting. Construction in Renville is anticipated to begin in the third quarter of 2014. The Renville project will produce Renewable Natural Gas and Crop Nutrients (fertilizer). The technology is proven. There are several thousand projects in Europe using this technology.

The project planned for SE Minnesota is to replicate the "Renville Renewable Energy Project." This proposal covers a necessary first step to adequately plan and execute an eventual capital equipment project. The SE Minnesota project will use the abundance of waste material - most of which are now being land applied and threaten water quality -in the Whitewater / Root River region to produce Renewable Natural Gas and Crop Nutrients using proven technology.

## II. PROJECT ACTIVITIES AND OUTCOMES

**Activity 1: Whitewater / Root River Region Feedstock Assessment** **Budget: $ 249,085**

An assessment of the available feedstocks is required to determine the best site for a regional project. It has already been determined that there is an abundance of waste streams from dairy farms, food processing plants, turkey growers and hog operations that are currently land applied. It has also been determined that there is an abundance of food waste available from Rochester's medical and hospitality complex, and that source will grow with the planned Destination Medical Center. A comprehensive feedstock assessment will determine the most economic location for the project. A primary objective will be to determine the transportation costs for delivering the feedstocks to a regional anaerobic digestion project. The feedstock assessment will also determine the "physical plant size" required to process the available waste materials.

| Outcome | Completion Date |
|---|---|
| *1.* Determine available feedstocks that can be economically sourced with long-term contracts. | June 30, 2016 |
| *2.* Determine regional anaerobic digestion plant size and costs based on SE Minnesota feedstock availability. | December 31, 2016 |

**Activity 2: On-farm Manure Management Evaluation** **Budget: $ 70,300**

There is an abundance of large and small dairy farms in SE Minnesota. Dairy manure can be a potential feedstock for a regional anaerobic digestion project, but a prohibitive economic factor is the cost of transport due to the amount of water in dairy manure. Two dairy farms (one large and one small) in SE Minnesota have existing low-cost systems for separating manure solids and liquids. Both are successful installations that have been operated for several years.

Using these two farms as test sites, this activity will determine the economics of separating the liquid and solid components of dairy manure, along with the transport of solid manure to a regional project. It is anticipated that a "model" may be determined for other dairies to provide their manure to a regional project rather than continue to land apply the manure.

| Outcome | Completion Date |
|---|---|
| *1.* Determine a cost-effective system for using dairy farm manure in a regional anaerobic digestion project to produce Renewable Natural Gas and Fertilizer. | November 1, 2016 |

**Activity 3: Nutrient Recovery Agronomic Evaluation** **Budget: $ 185,000**

Using previous, non-ENRTF, grant funds, a pilot facility has been constructed to process feedstocks for the Renville, MN project. The pilot facility will be available to process feedstocks available in the Whitewater / Root River region. The pilot facility is designed to take available feedstocks from a project area and produce small quantities of Renewable Natural Gas and Crop Nutrients (fertilizer). The pilot facility will be able to determine the output of Renewable Natural Gas from a proposed project, as well as the output of fertilizer. Because the fertilizer from the SE Minnesota project will replace commercial fertilizer, its efficacy must be demonstrated for farmers and agronomy dealers in the region of the project. A test-plot program conducted by the University of Minnesota's Southwest Research and Outreach Center in Lamberton will work with the project team to fill this need.

| Outcome | Completion Date |
|---|---|
| *1.* Demonstrate that fertilizer produced from waste streams that are currently land applied will be acceptable to local agronomy deals and their agricultural customers. | May 1, 2018 |

**III. PROJECT STRATEGY**

**A. Project Team/Partners**

Agri-Waste Energy Operations Inc.- Ray Davy, proforma and feedstock supply analysis. Bob Peplin, BMP and feedstock analysis. Randy Stone, pilot facility management and feedstock testing. ENRTF funded.
University of Minnesota (St. Paul and Lamberton) – William Lazarus (St. Paul), manure handling system economic analysis (in-kind). Dr. Paulo H. Pagliari (Lamberton), agronomic evaluation of fertilizer at field and lab scale. ENRTF funded.
Anaergia –Ashwani Kumar, technology provider, develop design criteria and estimated construction costs based on feedstock analysis. ENRTF funded.
Humphrey Engineering –Roger Humphrey, network with dairy suppliers and manure handling analysis. ENRTF funded.

**B. Project Impact and Long-Term Strategy**

Proposed project is a necessary first step in adequately planning and executing an eventual capital equipment project that will construct the regional anaerobic digestion project. ENRTF funds will not be requested for actual project construction, private financing will be used. However, the critical elements of feedstock characterization for the karst region, economic evaluation of manure handling systems in the region and agronomic study of fertilizer provide the necessary foundation to ensure that the eventual project operations will actually result in desired environmental outcomes.

**C. Timeline Requirements**

The proposed project can be completed in a 3-year time frame. Three years are needed to complete the project in order to adequately measure and inform crop responses in activity 3 (agronomic evaluation).

# 2015 Detailed Project Budget

**Project Title: Reducing Land Applied Agricultural Waste in SE Minnesota**

**IV. TOTAL ENRTF REQUEST BUDGET $504,385 3 years**

| **BUDGET ITEM** *(See "Guidance on Allowable Expenses", p. 13)* | **AMOUNT** |
|---|---|
| **Personnel:** | $ - |
| Project manager, Agri-Waste Energy Operations: manage project outcomes, grant administration, coordinate project team, feedstock assessments, prepare final grant deliverables, 15% FTE. Three-year position. | $ 67,200 |
| Project engineer, Agri-Waste Energy Operations; feedstock characterization and analysis procedures, initial plant engineering. 10% FTE. Three-year position | $ 52,200 |
| Pilot personnel, Agri-Waste Energy Operations; manage testing and analysis of potential project feedstocks at pilot facility. 10%FTE. Two-year position | $ 32,500 |
| **Contracts:** | $ - |
| University of Minnesota: personnel to conduct field and lab tests of crop responses to digested nutrients. Contract amount includes analytical testing. | $ 139,500 |
| Humphrey Engineering: manure management review and testing, develop general arrangement, process flow drawings and cost estimates. | $ 40,800 |
| Anaergia: technology supplier, develop material and energy mass balance for each feedstock, develop material and energy mass balance of post nutrient technologies. | $ 143,000 |
| 3rd party analytical testing for biogas methane potential. Contractor yet to be identified. | $ 18,000 |
| **Travel:** in-state travel for project staff. Mileage estimates based on a total of 9,000 (72 trips) miles at a rate of $.565 per mile to collect feedstock samples and bring to pilot facility for testing. Also includes shipping of samples to third party analytical testing lab, 41 samples at a cost of $100 per sample. | $ 9,185 |
| **Printing/material production:** printing of final report (200 copies), printed engineering drawings and feasibility materials, printed materials of agronomic evaluation reports and documents (500 copies). Printing estimates based on past report production costs. | $ 2,000 |
| **TOTAL ENVIRONMENT AND NATURAL RESOURCES TRUST FUND $ REQUEST =** | $ 504,385 |

**V. OTHER FUNDS** *(This entire section must be filled out. Do not delete rows. Indicate "N/A" if row is not applicable.)*

| **SOURCE OF FUNDS** | **AMOUNT** | **Status** |
|---|---|---|
| **Other Non-State $ To Be Applied To Project During Project Period:** | N/A | *N/A* |
| **Other State $ To Be Applied To Project During Project Period:** NextGen Energy Board, Bioenergy and Biochemical Grant Application, Minnesota Department of Agriculture | $ 220,000 | *Pending* |
| **In-kind Services To Be Applied To Project During Project Period:** Project personnel professional services. | $ 165,000 | *Secured* |
| **Funding History:** St. Paul Port Authority | $ 85,000 | Secured |
| Minnesota Department of Agriculture | $ 270,000 | Secured |
| **Remaining $ From Current ENRTF Appropriation:** | N/A | *N/A* |

# Reducing Land Applied Agricultural Waste in SE Minnesota

**Figure 1: Process Flow for Regional Anaerobic Digestion Project**

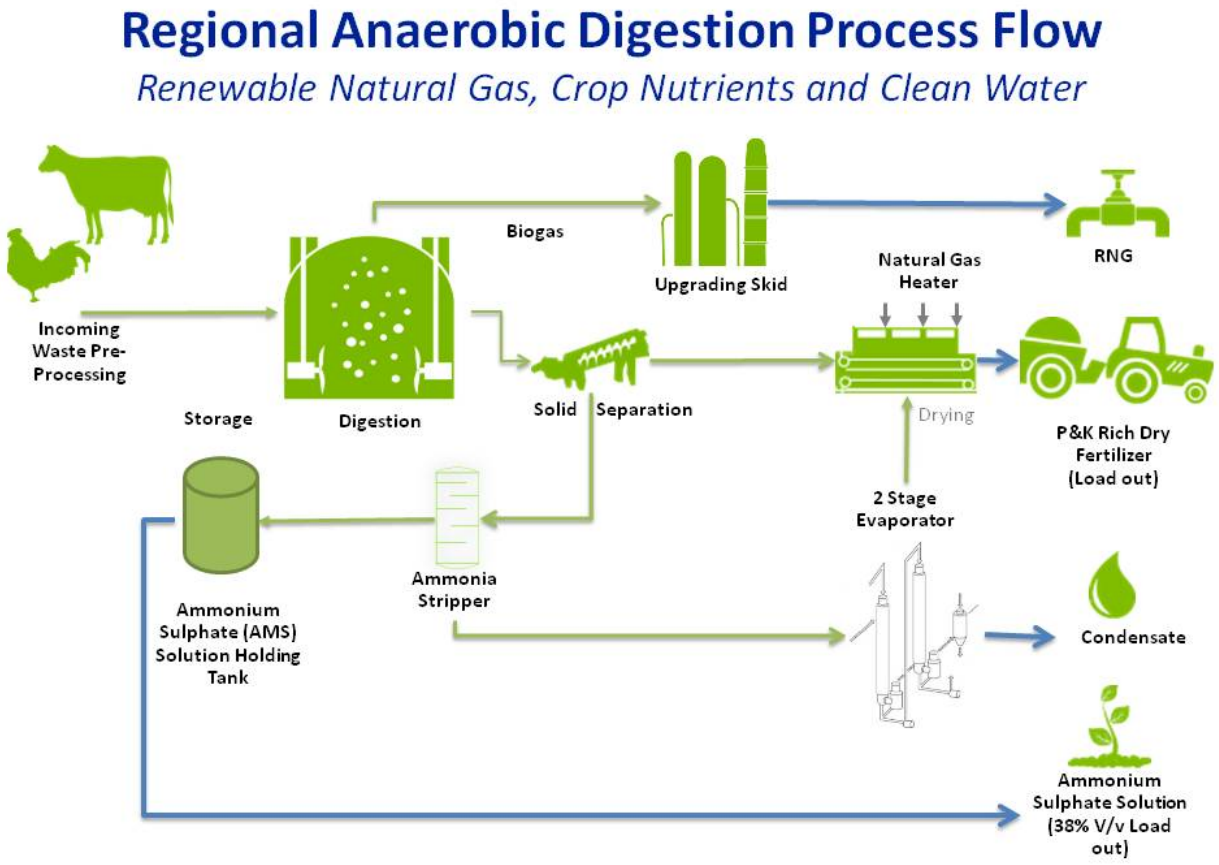
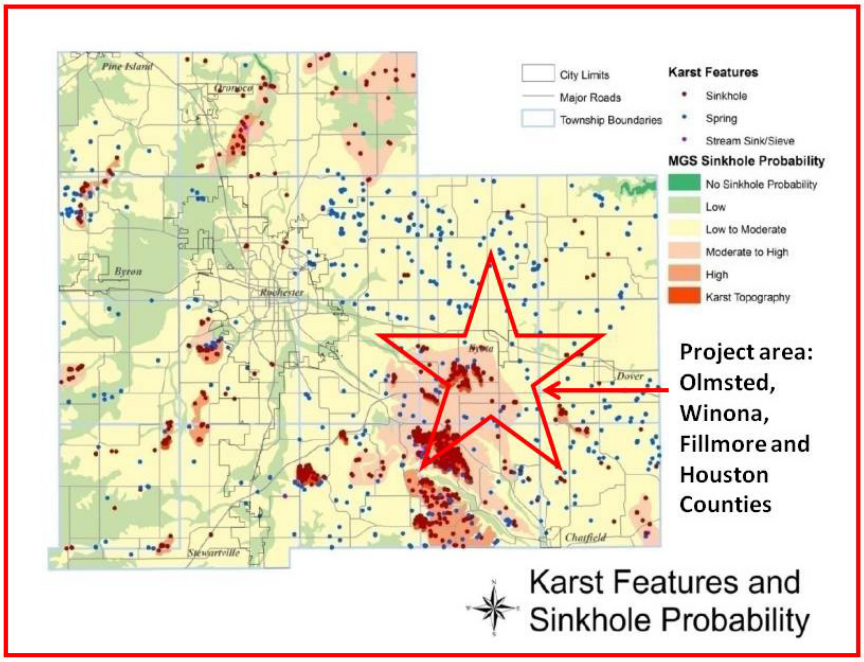



**Figure 2: Proposed Project Location in Environmentally Sensitive Karst Region**




Minnesota Geological Survey's "Geologic Atlas – Olmsted County, Minnesota",

Land application of organic waste streams in environmentally sensitive areas requires a specialized nutrient management approach. Project is proposing to develop effective nutrient management strategies for land application of fertilizer from a regional anaerobic digestion project.

**Reducing Land Applied Agricultural Waste in SE Minnesota**

Project Manager Qualifications and Organization Description

**Project Manager Qualifications**

Raymond Davy is President and CEO of Agri-Waste Energy Operations, Inc. Ray has led the project team for the Renville Renewable Energy Project through a Phase 1 Feasibility Study (funded by the St. Paul Port Authority & MN Dept. of Commerce) and a Phase 2 Feasibility Study (funded by the MN Dept. of Agriculture). The Renville Project is now proceeding through the permitting process. Start of construction is planned for the 4th quarter of 2014 with commissioning in the 1st quarter of 2016.

Ray is a graduate of the University of Minnesota, College of Agriculture.

**Organization Description**

Agri-Waste Energy Operations, Inc. is organized to provide a team approach to the development of a biogas project. The Agri-Waste Energy Operations development team is focused on the following steps necessary for a successful biogas project:

1. Site selection **/** Location, permits and distances: A well-developed biogas system begins with the project site. The project site needs to be secured in a long-term agreement, either a lease or purchase, in an area that can be permitted. Distance from potential feedstock sources is a critical factor.
2. Feedstock Agreements / Feedstock volume, availability and quality: A feedstock matrix of available feedstocks needs to be created and the project designed around multiple blends of available feedstocks. If a system is dependent on a single or only a few sources of feedstock material, project risk is increased.
3. Off-take agreements: Credit worthy purchasers of the products produced by the project need to be in place with long-term contracts that will support the project's financing.
4. Technology Selection: A "technology team" needs to be assembled to include: the technology provider; the engineering firm; and the construction company.

For the project proposed in this application the Agri-Waste Energy Operations development team would organize its team members to proceed with the above tasks.