

**Environment and Natural Resources Trust Fund
2010 Request for Proposals (RFP)**

LCCMR ID: 056-B1

Project Title:

Optimizing Biomass Procurement & Digestion for Renewable Energy [Received letter reducing budget to \$3,

LCCMR 2010 Funding Priority:

B. Renewable Energy Related to Climate Change

Total Project Budget: \$ \$3,963,000

Proposed Project Time Period for the Funding Requested: 2 years, 2010 - 2012

Other Non-State Funds: \$ \$250,000

Summary:

Project will increase biomass production through agronomic methods, reduce harvesting costs, increase bi-product values of digestion to make community digester economics replicable, viable & energy carbon neutral throughout Minnesota.

Name: John Madole

Sponsoring Organization: John Christopher Madole Associates, Inc.

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Web Address: _____

Location:

Region: SW

County Name: Redwood

City / Township: Belview

_____ Knowledge Base	_____ Broad App.	_____ Innovation
_____ Leverage	_____ Outcomes	
_____ Partnerships	_____ Urgency	_____ TOTAL

PROJECT TITLE: Optimizing Biomass Procurement & Digestion for Renewable Energy

I. PROJECT STATEMENT

1. *HOW the project will achieve those goals (i.e. the project itself and types of activities involved).*
1. PROJECT RATIONALE: Community Digesters around 5 ton/day capacity cost +\$90 per ton to operate which is not currently viable. Larger digester projects (500 tons/day) are viable enough to purchase crop residues and silage for 25% of feedstock inputs. If community digesters could be made more economically viable, then purchases of crop residues and grasses could become common in rural Minnesota. This would go far in shifting Minnesota agriculture towards renewable, carbon neutral energy production.
2. PROJECT GOAL: Create a viable agro-economic model that optimizes biomass procurement, produces green renewable energy and creates markets for bi-products.
3. HOW GOALS ARE ACHIEVED: Project will complete the following:
 - A. Increasing yields of biomass while reducing fertilizer inputs through use of cover crops, land application of digester outputs and other.
 - B. Reduce production cost of biomass through using onepass equipment and other implement improvements.
 - C. Research, development and marketing of digester bi-products to increases digester revenues.

II. DESCRIPTION OF PROJECT RESULTS

Result 1: Increase Biomass Production Per Acre **Budget:** \$ 180,000

Cover crops grown with corn/sudan/other grasses to increase biomass yields & reduce erosion. Standing corn planted into permanent legume cover. Biomass harvest sustainability measured using land application of digester outputs as input and biomass extraction as output.

Deliverable

- | | Completion Date |
|--|------------------------|
| 1. <i>Biomass production increased 10% while reducing fertilizer Outcome #</i> | <i>June 2012</i> |
| 2. <i>Land application of digester output found to provide sustainable production of biomass. Outcome #2</i> | <i>June 2012</i> |

Result 2: Reduce Biomass Harvesting Costs **Budget:** \$ 1,600,000

Modifications will be made to harvesting equipment to enable onepass harvest of stover on field. Similar modifications will be made to grass cutting & baling equipment. Forage chopper unit will be used to harvest silage of corn/sudan/other grasses.

Deliverable

- | | Completion Date |
|---|------------------------|
| 1. <i>Stover and grass production costs reduced by 50% (Outcome #1)</i> | <i>June 2012</i> |

Result 3: Increase bi-product revenues of community digester **Budget:** \$ 3,303,000

Process variety of feedstocks including stover, silage, and grasses to produce natural gas and LNG. Warm CO2 from digester will be used to heat greenhouse to produce horticultural & food crops. Aquatic species will be investigated to produce feed, fiber, and fuel source from nutrients in digester outputs.

Deliverable

- | | Completion Date |
|---|------------------------|
| 1. <i>Reduce digester cost of \$90 per ton to under \$60 per ton through increased bi-product revenues.</i> | <i>June 2012</i> |

Result 4: Community Education **Budget:** \$ 75,000

Farmers, economic development officials, decision makers, and academics are informed of the demonstration project and the resulting findings and policy implications.

Deliverable**Completion Date**

1. Annual open houses, multiple advisory committee meetings, reports, tours, and seminars each year

Throughout grant

III. PROJECT STRATEGY**A. Project Team/Partners**

John Christopher Madole Associates, Inc. (JCMA) will be the lead in research, permitting and project management. Onepass Harvesting, Inc. (Eric Woodford and Joe Regnery, owners), specializes in custom baling of corn stover, modify harvesting implements and harvest corn stover, grasses, and silage utilizing their specialized equipment. The Redwood Area Development Corporation (RADC) will likely become a partner in the project, pending board approval. RADC would serve as the fiscal agent in the project as well as organize stakeholder meetings and outreach efforts. Also subject to approvals, the U of M Southwest Research and Outreach Center (SWROC) will provide agroecomics expertise through soil scientist Dr. Jeff Strock. John Christopher Madole Associates, Inc. will also provide guidance in bi-product research from digester outputs. Finally, we are developing an Advisory Committee comprised of respected public officials, academicians, business leaders, and non-profit organizations, for example the Mayor of Belview, a Redwood County Commissioner and Dr. Jeff Strock (SWROC).

B. Timeline Requirements

FY 2010: Research all tasks, initial construction of implements for harvesting, permitting for the digester facility, and measuring control yields for biomass crops prior to treatment and development of stakeholder/community engagement presentations/seminars.

FY 2011: Demonstrate all harvesting equipment on 1000 acres of land and supervision of land preparation and agronomy for this acreage by the U of M SWROC. Construct and begin operations of digester facility & greenhouse. Extensive outreach to farm organizations, economic development organizations, area schools, and Indian reservations.

FY 2012: Continue research to further refine and improve the economic viability of community digesters. Public outreach/education efforts continue. Produce reports and findings and make available through a variety of statewide forums.

C. Long-Term Strategy

This proposal supports a larger proposed digester cooperative that will consume 26,600 tons of corn stover and up to 20,000 tons of grasses & silage annually. Demonstration of lower cost biomass harvesting techniques, improved biomass production and higher value bi-product revenues through the LCCMR pilot will confirm improved economics to make smaller scale community projects viable throughout Minnesota as well as help move the larger digester project. The improved economics will also allow the project to increase the purchase of grasses focused on RIM and CRP lands. Since the larger project will cost between \$50 million and \$100 million, demonstration of actual stover, grass, and silage production prices as well as demonstration of end markets for bi-products can significantly help the project, besides demonstrate the viability of small scale projects throughout Minnesota. The capital costs of the larger project will all be privately raised. Based on existing economics, construction of the larger facility would enable the smaller research digester to continue to operate as a research facility to further refine biomass and digestion technology and production practices. Although research will be conducted on a variety of feedstocks including manures, solid waste, biosolids, grasses, silage, and corn stover, the research digester will not be dedicated after the three year demonstration to the processing of solid waste or biosolids derived from waste water. The research digester will however be dedicated to research for the larger project, the University of Minnesota Southwest Research and Outreach Center, and other public institutions.

Optimizing Biomass Procurement & Digestion for Renewable Energy

IV. TOTAL PROJECT REQUEST BUDGET (3 years)

BUDGET ITEM	AMOUNT
Personnel: John Madole to participate in bi-products research & manage project. (working 1/3 time at \$30,000/ year including all benefits. This includes 85% towards salary and 15% towards benefits.) List out by position or position type - one line per position/position type. For each, provide details in this column on the inputs: i.e. % dollars toward salary, % dollars toward benefits, time period for position/position type, and number of people in the position/position type.	\$ 90,000
Contracts:	\$ -
John Christopher Madole Associates for bi-product research	\$ 345,000
Digester Operations & Research Contractor	\$ 525,000
Pat Mulloy for permitting consulting	\$ 50,000
Onepass Harvesting, Inc. for developing equipment and harvesting biomass	\$ 800,000
Greenhouse Operator to grow produce and horticultural products	\$ 150,000
U of M Southwest Research & Outreach Center for increasing biomass through agronomy	\$ 180,000
Redwood Area Development Corporation for community ed & outreach	\$ 75,000
Equipment/Tools/Supplies:	\$ -
Equipment Modifications on harvesting equipment	\$ 800,000
Aquatics production unit and testing equipment	\$ 50,000
City Soil & Greenhouse Company supply 10,000 sf greenhouse/biofilter	\$ 200,000
Digester Vendors for installation of 5 ton/day digester and preprocessing equip	\$ 1,893,000
Acquisition (Fee Title or Permanent Easements): NA	\$ -
Travel: Contractors expected to cover cost of all travel.	\$ -
Additional Budget Items:	\$ -
TOTAL PROJECT BUDGET REQUEST TO LCCMR	\$ 5,158,000

V. OTHER FUNDS

SOURCE OF FUNDS	AMOUNT	Status
Other Non-State \$ Being Applied to Project During Project Period: Additional funding expected, but amounts unknown at present.	Unknown	Unsecured
Other State \$ Being Applied to Project During Project Period:	\$ -	NA
In-kind Services During Project Period: In-kind match from JCM Associates will be provided over project.	\$ 250,000	Secured
Remaining \$ from Current Trust Fund Appropriation (if applicable):	NA	NA
Funding History: Additional Funding is expected prior to July 2010, amount unknown.	Unknown	Unsecured

OPTIMIZING BIOMASS PROCUREMENT AND DIGESTION FOR RENEWABLE ENERGY

Project Manager Qualifications and Organization Description

John Christopher Madole Associates, Inc. began formal work with thermophilic anaerobic digesters to recover biogas in the energy sector in 1987, so the firm has been actively involved in the Energy sector for 21 years. The past seven years have focused on the energy sector. The firm was responsible for designing, constructing, and operating the recycling and composting facilities for the 1996 Atlanta Olympics and the 2002 Salt Lake Olympic Games. Mr. Madole was a significant researcher and writer of the RockTenn Biomass Report prepared by the Green Institute and the Biomass Modeling Report prepared by CEE for Xcel Energy. Mr. Madole also developed the wood waste procurement system for District Energy St. Paul, including planning for logistics, contracting, and strategy to procure over 800 tons per day of biomass. Mr. Madole has been an environmental planner in Minnesota for over 30 years, including time working for the Minnesota Pollution Control Agency.

Eric Woodford is the most experienced and largest custom baler in the State of Minnesota. With his business partner Joe Regnery, the two have decades of farming and farm equipment development experience. **OnePass Harvesting Inc.** is their business.

Bruce Fulford of City Soil & Greenhouse Company has over 30 years of experience developing biofilters, and greenhouses heated from composting and digestions facilities.

Dr. Jeff Strock of the University of Minnesota Southwest Research & Outreach Center, is a soil scientist who conducts research in the areas of soil and water management and conservation to maintain profitability while preserving clean air and water. Dr. Strock's research program, focused on nitrogen, provides valuable information to agricultural and non-agricultural stakeholders and policy makers about the associated risks, benefits, and costs of various management practices on agricultural production, profitability, and environmental quality.

Julie Rath and Pat Dingels, Redwood Area Development Corporation Economic Development and Community Development Specialists assist potential projects in community relations, securing funding, applying for grants and developing viable business plans. Both staff members are invaluable resources in making any project work in Redwood County.

