TECHNOLOGY PROVIDER
TECHNOLOGY INFORMATION REQUEST

Technology/Service:	Northern Biogas - Complete Mix Digester		
Information by:	Guy Selsmeyer	**Date:**	January 22, 2019

COMPANY INFORMATION

Company:	Northern Biogas		
Phone:	(920) 309-1015	**Web Site:**	http://northernbiogas.com/
Address:	2357 Pamperin Road, Suite 4	**City:**	Green Bay
State:	Wisconsin	**Zip Code:**	54313

TECHNICAL CONTACT

Name:	Guy Selsmeyer
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City:	Green Bay
State:	Wisconsin
Zip Code:	54313

DEMONSTRATION SITE CONTACT

Site Name:	Provided upon request
Contact:	
Title:	
Phone:	
Email:	
Address:	
City:	
State:	
Zip Code:	

INITIAL TECHNOLOGY OVERVIEW

This information is to guide in the development of a more specific and detailed Technology Information Request.
Please answer the following questions for each Technology or Service Provided.

What is the name of the technology or service you provide?

Northern Biogas provides a reliable yet affordable complete mix anaerobic digester system that manages waste and odor while providing an economic value to the client

Describe how this technology is used in a larger Nutrient Management System. *Please be as detailed as possible.*

Northern Biogas has recognized the advancement of European technology surrounding anaerobic digestion and have modified designs based on actual experience in Wisconsin's harsh environment. The Northern Biogas design uses the concept of a total mix digester which provides maximum gas production to treat the full manure stream. The system lends itself to the addition of other organic substrates, such as food waste, both critical when maximizing your return on investment.

How many systems do you have installed on dairy farms or other livestock operations?

SYSTEMS	NUMBER OF SITES	SIZE OF INSTALLATIONS
Dairy	14	1,000 to 11,000 cows

Pork		
Poultry		

What's the smallest and largest farm using your system?

1,000 cows to 11,000 cows

Does this technology have a 12-month record of reliable performance on at least three dairy farms?

Yes

Do you have a preferred region or area for the location of projects?

National

Input and output of your unit/system – do you have a mass balance analysis?
If a mass balance is available, please include below or attach as a separate document.

A mass balance can be prepared for each project.

Input material description and characteristics:
For example: raw manure, digestate, screened digestate, suitable non-farm feedstocks, other.

The input to digester systems is the full manure stream including flush water and food waste and other organics are often additional feedstocks to boost methane outputs.

Does the technology treat the full manure stream for a farm or a fraction of the stream?

The digester can be designed to treat the full manure stream including flush water from the milking parlor.

Do you consider this a mature system or ongoing farm development?

Mature technology with proven results.

Any weather constraints? **Yes** ☐ **No** ☑ *If so, please describe.*

Any bedding constraints? **Yes** ☐ **No** ☐ *If so, please describe.*

Sand bedding may have adverse impacts on anaerobic digestion systems. Sand separation technologies is recommended.

Output material description and characteristics:
Please include the % of the total stream for each material, i.e. 10% fiber and 90% screened liquid by weight.

Output streams are approximately 8% total solids and 92% nutrient liquids for land application or nutrient recovery.

Do the Outputs of the process have a resale market identified? **Yes** ☑ **No** ☐
If so, under what brand name or who is the contract with?

Markets are available to sell electricity, renewable natural gas and compressed natural gas and environmental attributes, such as, carbon credits, RINs and RECs. The digestate solids and liquids can be sold as compost or land applied as fertilizer on farm fields.

Is this process scalable and to what extent (top and bottom limits)? **Yes** ☑ **No** ☐ *If so, please describe.*

The system can be designed for any herd size.

Do you have a known scaling factor? **Yes** ☑ **No** ☐ *If so, please describe.*

Northern Biogas systems are scalable for any size dairy.

Does this technology require any air input? **Yes** ☐ **No** ☑

What is the preferred air connection? *For example: psi, fitting size, air quality.*
If not distributed by the system, please list each connected device.

Does this technology require any water input? **Yes** ☐ **No** ☑ *If so, please describe.*

What is the preferred water connection? *For example: psi, fitting size, water quality, gpm.*
If not distributed by the system, please list each connected device.

Does this technology require any electrical input? **Yes** ☑ **No** ☐ *If so, please describe.*

Standard commercial electricity supply for motors, pumps, mixers, and process control

What is the preferred electrical connection? *For example: phase #, voltage, full load amps.*
If not distributed by the system, please list each connected device.

480 volt three-phase

Does this technology require any mechanical input? **Yes** ☐ **No** ☑ *If so, please describe.*

What is the preferred mechanical connection? *For example: horsepower, connection, rpms.*
If not distributed by the system, please list each connected device.

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Does this system require any special plumbing? **Yes** ☐ **No** ☑ *If so, please describe what is required.*

Does this system require any special foundations or pads? **Yes** ☑ **No** ☐ *If so, please describe.*

The digester tanks have standard concrete ring-wall foundations.

Do you consider this technology part of a larger system that you provide? **Yes** ☑ **No** ☐ *If so, please describe.*

The digester can be designed as a stand-alone system or incorporate solids separation, heat recovery, bedding recovery and nutrient extraction systems.

Does your system require any other components that you do not provide or are not included in your proposal? **Yes** ☐ **No** ☑
If so, please describe.

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How is the system delivered to the site? *For example: skid mounted, assembled on site, constructed on site.*

Assembled on-site with additional site construction.

Is this system portable or configured in such a way that it could be easily transported for use in several locations?
Yes ☐ **No** ☑ *If so, please describe.*

Has your technology been accepted by the NRCS and is it included into a practice standard? **Yes** ☑ **No** ☐
If so, please describe if necessary.

Are there any unusable or hazardous byproducts of this process? **Yes** ☐ **No** ☑
If so, please describe the product and recommended means of disposal.

What spare parts and redundant components are included with the system?

Spare parts are commercially available.

How is the system controlled and what are the components and capabilities of the control system?

The system can be automated for 24/7 operation using on-line SCADA and PLC systems.

What is the usable life of the system?

20+ years

What is the salvage value at the end of the usable life?

Main mechanical components have salvage value

What is the educational and technical level of competence for the operation of the system?

Local qualified labor can be trained to operate the system

What level of maintenance is required for the system?
Please indicate if rebuilds or major components must be replaced and what the frequency is for these components.

Are consumables used in the process? Yes ☐ No ☑
Please provide the nature and purchase relationship for these consumables. For example: proprietary, special contract, generally available.

Which of these NRCS codes would your technology be classified under? *Check all that apply. Add if necessary.*

CODE	NRCS DESCRIPTION	CHECK ALL THAT APPLY
472	Access Control	☐
560	Access Road	☐
309	Agrichemical Handling	☐
371	Air Filtration and Scrubbing	☐
591	Amendments for the Treatment of Agricultural Waste	☐
366	Anaerobic Digester	☑
672	Building Envelope Improvement	☐
372	Combustion System Improvement	☑
317	Composting Facility	☐
554	Drainage Water Management	☐
375	Dust Control from Animal Activity on Open Lot Surfaces	☐
373	Dust Control on Unpaved Roads and Surfaces	☐
374	Farmstead Energy Improvement	☑
512	Forage and Biomass Planting	☐
561	Heavy Use Area Protection	☐
516	Livestock Pipeline	☐
590	Nutrient Management	☑

521A	Pond Sealing or Lining, Flexible Membrane	☐
533	Pumping Plant	☐
588	Roof Runoff Structure	☐
367	Roofs and Covers	☑
318	Short-Term Storage of Animal Waste and By-Products	☐
570	Stormwater Runoff Control	☐
606	Subsurface Drain	☐
635	Vegetated Treatment Area	☐
601	Vegetative Barrier	☐
360	Waste Facility Closure	☐
632	Waste Separation Facility	☐
313	Waste Storage Facility	☐
634	Waste Transfer	☐
629	Waste Treatment	☑
359	Waste Treatment Lagoon	☐
		☐
		☐
		☐

Can you provide an estimate of the capital required for the installation of this technology?
Please include all components and designate if provided by you or others.

The capital requirements to install a digester will vary widely depending on digester design, size, and choice of equipment for utilization of the biogas and/or for separating out manure fiber. If the renewable energy portion of the project is not included (i.e., gen-set or gas upgrade); the estimated digester CapEx range is $0.0015 per 1000 gallons of capacity for a larger system and $0.0065 per 1000 gallons of capacity for a smaller system

Can you provide an estimate of the operational costs required for this technology?
Please include all costs and designate if provided by you or others.

Annualized operations and maintenance cost of a dairy anaerobic digester and genset are estimated to be approximately 3 to 5 percent of the total capital cost of the system on a project by project basis.

Is there financing available for this system? **Yes** ☑ **No** ☐ *If so, what are the conditions for this financing?*

Northern Biogas can help arrange project financing.

Is the system available for lease? **Yes** ☐ **No** ☑ *If so, please describe.*

What sort of warrantee or guarantee do you provide with this technology?
Do you provide any performance guarantees or strictly defects in parts and materials?

Standard warranty on every project and passes along any equipment warranty to the owner.

Explain how this system is unique or transformative and how does it improve upon or go beyond other technologies that are currently available.

Northern Biogas was formed by a group of professional Wisconsin Dairy Producers, licensed engineers and project managers to build and manage biomass renewable energy projects. The underlying philosophy of Northern Biogas is to provide a reliable and affordable anaerobic digester that can offer a means of managing waste and odor while providing an economic value to the client and community.

Would you be willing to provide a location for a site visit by Newtrient? **Yes** ☑ **No** ☐ *If so, please provide location.*

TECHNOLOGY REFERENCES

Please provide customers with whom we can discuss this technology and its performance.
Include a company name, location, contact name and contact information.

Reference 1

Company Name:	Vir-Clar Farm Power, Fon du Lac, WI
Company Location:	Fond du Lac, WI
Contact Name:	
Contact Information:	

Reference 2

Company Name:	Rock Creek Digesters
Company Location:	Filer, ID
Contact Name:	
Contact Information:	

Reference 3

Company Name:	
Company Location:	
Contact Name:	
Contact Information:	

Reference 4

Company Name:	
Company Location:	
Contact Name:	
Contact Information:	

Are there any other facts about this technology that you feel should be included in this document?