



Technology/Service: Maas Energy Works - Covered Lagoon Digester

Information by: Doug Bryant

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COMPANY INFORMATION

Company: Maas Energy Works

Phone: (530) 710-8545

Web Site: <http://www.maasenergy.com/>

Address: 3711 Meadow View Drive #100

City: Redding

State: California

Zip Code: 96002

TECHNICAL CONTACT

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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?

MEW provides the choice of Producer-Owned or Developer-Owned turn-key anaerobic digestion and gas upgrading systems. We also provide all of the design, financial projections, grant financing, grid interconnection, air permits, procurement, and construction management. Once our projects are built we operate and monitor the digester and upgrading equipment 24x7.

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

MEW digesters are designed to handle the full manure stream from the dairy to produce renewable energy, excess heat for farm use, bedding and recovered nutrients for fertilizer and compost. The digester system reduces odors and greenhouse gas emission while recycling water for irrigation.

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

SYSTEMS

NUMBER OF SITES

SIZE OF INSTALLATIONS

Dairy	14 digesters processing cow manure 6+ digesters planned to be completed before the end of 2018	Herd sizes range from 500 to 10,000 cows
Pork	n/a	n/a
Poultry	n/a	n/a

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

The smallest is dairy farm with 500 milking cows. The largest is a digester system processing the daily manure from 10,000 milking cows.

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

Maas Energy Works' dairy digester systems in Northwest have years of documented reliable performance processing cow manure. Of our 8 operational digesters in California, all 8 of them have been operating for over 12 months. Our 6 projects in Washington and Oregon have been operating for as much as 9 years.

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

West Coast

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. The information is client confidential.

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 cleaning water from barns or milking parlor. Upon request we can also design and permit to receive food waste and other substrates.

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

The digester is designed to treat the full manure stream for a dairy including flush water from the milking parlor.

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

Mass covered lagoon and plug-flow anaerobic digester system are a mature technology with proven results.

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

Covered lagoon digesters work more efficiently in warmer climates but have installations all over the world.

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

Sand separation is advised to ensure proper operation of the digester.

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.

1.5%-2.5% suspended solids and fiber, 98% screened liquids that have been further digested for lagoon storage and field application

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?

Commercial markets are available to sell energy products (electricity, renewable natural gas and compressed natural gas) and environmental attributes, such as, Carbon Credits, RINs and RECs. The digestate solids, fiber and liquids can be sold as compost or field applied as fertilizer.

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

Digester system can be designed for any herd size.

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

Sizing and scaling factors are not a matter of technology but of economics.

Does this technology require any air input? Yes No

Ambient air

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

Outside air without treatment to supply the engine-generator.

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

In addition to the liquids for the manure stream, some water is needed for cleaning and engine cooling make-up water.

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.*

Standard connection

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

Standard commercial electricity supply for engine/generator sets controls and other equipment

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

Three-phase power may be required and grid interconnection if electricity is sold to the utility supplier.

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.*

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

All plumbing, electrical and mechanical is specified and sourced by MEW.

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

The digester is designed as a covered lagoon. The engine/mechanical building have standard concrete 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 can incorporate electricity generation equipment, biogas scrubbers, gas compression equipment or pipeline injection equipment.

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.

Additional components can be included such as receiving tanks, solid separators and nutrient recovery technologies. Additional components are sourced but not supplied by MEW.

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

MEW digester systems are constructed on site.

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.

Digesters are an approved NRCS standard practice

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 industry standard and available. MEW provides O&M services, parts and training.

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

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

What is the usable life of the system?

With proper O/M the system should operate 20-30 years

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

Main mechanical components such as the gen-set, blowers, valves, meters, etc. have some 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.

Component parts require maintenance and replacement per maintenance schedule. Daily inspections and periodic response to system upsets are required

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.

Some routine maintenance consumables such as oil and parts.

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	<input type="checkbox"/>
560	Access Road	<input type="checkbox"/>
309	Agrichemical Handling	<input type="checkbox"/>
371	Air Filtration and Scrubbing	<input checked="" type="checkbox"/>
591	Amendments for the Treatment of Agricultural Waste	<input type="checkbox"/>
366	Anaerobic Digester	<input checked="" type="checkbox"/>
672	Building Envelope Improvement	<input type="checkbox"/>
372	Combustion System Improvement	<input type="checkbox"/>
317	Composting Facility	<input type="checkbox"/>

554	Drainage Water Management	<input type="checkbox"/>
375	Dust Control from Animal Activity on Open Lot Surfaces	<input type="checkbox"/>
373	Dust Control on Unpaved Roads and Surfaces	<input type="checkbox"/>
374	Farmstead Energy Improvement	<input type="checkbox"/>
512	Forage and Biomass Planting	<input type="checkbox"/>
561	Heavy Use Area Protection	<input type="checkbox"/>
516	Livestock Pipeline	<input type="checkbox"/>
590	Nutrient Management	<input checked="" type="checkbox"/>
521A	Pond Sealing or Lining, Flexible Membrane	<input type="checkbox"/>
533	Pumping Plant	<input type="checkbox"/>
588	Roof Runoff Structure	<input type="checkbox"/>
367	Roofs and Covers	<input type="checkbox"/>
318	Short-Term Storage of Animal Waste and By-Products	<input type="checkbox"/>
570	Stormwater Runoff Control	<input type="checkbox"/>
606	Subsurface Drain	<input type="checkbox"/>
635	Vegetated Treatment Area	<input type="checkbox"/>
601	Vegetative Barrier	<input type="checkbox"/>
360	Waste Facility Closure	<input type="checkbox"/>
632	Waste Separation Facility	<input type="checkbox"/>
313	Waste Storage Facility	<input type="checkbox"/>
634	Waste Transfer	<input checked="" type="checkbox"/>
629	Waste Treatment	<input checked="" type="checkbox"/>
359	Waste Treatment Lagoon	<input checked="" type="checkbox"/>
634	Waste reception pit larger than 5000 gal.; Agitator-small; Concrete Sand Settling Lane; PVC Pipe greater than 8 Inch/Diameter	<input checked="" type="checkbox"/>
533	Electric - Powered Pump >3 to 10 HP; Electric - Powered Pump >3 to 10 HP	<input checked="" type="checkbox"/>
		<input type="checkbox"/>

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 the digester technology chosen, farm size, biogas end-use, project location and/or for type of manure separation. The current capital cost range for complete digester systems is estimated at \$750 to \$1250 per milking cow depending on herd size.

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.

Operational costs vary widely depending on the digester technology chosen, farm size, biogas end-use and location of the project. Maas Energy Works provides all customers with a detailed analysis of pro forma financial projections. These are given to each potential customer at no cost prior to signing any contracts.

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

If you want to own a digester, Maas Energy Works will handle design, financial projections, grants and present options for financing through a network of financial institutions and equity partners. If you prefer not to own the digester, we can develop, build, and operate the facility at no cost to you, paying you a guaranteed annual rate per cow.

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

What sort of warranty or guarantee do you provide with this technology?

Do you provide any performance guarantees or strictly defects in parts and materials?

The majority of the equipment providers and contractors that are contracted to build these projects provide warranties for their equipment and work performed. MEW understands this industry better than most and knows that nothing with manure is guaranteed. All digesters that Maas Energy Works has built are still operating today and we feel confident in the conservative projections given to each of our customers.

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

Maas Energy Works offers Producer-Owned or Developer-Owned digester systems. Your Choice.

If you want to own a digester, Maas Energy Works will handle design, financial projections, grant financing, grid Interconnection, air permits, procurement, and construction management. When the project is online, we will run it for you with 24x7 monitoring and operations support. Our digester projects average 94% up-time.

If you prefer not to own the digester, we can develop, build, and operate the facility at no cost to you, paying you a guaranteed annual rate per cow.

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

California scheduled upon request

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:	References available to potential clients upon request
Company Location:	
Contact Name:	
Contact Information:	

Reference 2

Company Name:	References available to potential clients upon request
Company Location:	
Contact Name:	
Contact Information:	

Reference 3

Company Name:	References available to potential clients upon request
Company Location:	
Contact Name:	
Contact Information:	

Reference 4

Company Name:	References available to potential clients upon request
Company Location:	
Contact Name:	
Contact Information:	

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