



Technology/Service: Hydrothermal Processing of Wet Organic Wastes

Information by: Genifuel Corporation

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COMPANY INFORMATION

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TECHNICAL CONTACT

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City: Salt Lake City

State: Utah

Zip Code: 84109

DEMONSTRATION SITE CONTACT

Site Name:

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? Hydrothermal Processing

Describe how this technology is used in a larger Nutrient Management System. Hydrothermal Processing converts wet wastes into biocrude oil and methane gas. Wet wastes could include animal manures, residuals from food processing or rendering plants, other agricultural wastes, wastes from breweries, and other similar wet organic wastes. The process eliminates the organic waste, leaving no residual for disposal. The water in the wet wastes is recovered and is clear and sterile, and contains the nutrients present in the feedstock.

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

SYSTEMS	NUMBER OF SITES	SIZE OF INSTALLATIONS
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Dairy	1	Demonstration system
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Pork		
Poultry		

Do you have a preferred region or area for the location of projects? No restriction on location.

Location of farm(s)? No restriction on location.

What's the smallest and largest farm using your system? Dairy is app. 10,000 cows, but the system is processing only a fraction.

Input and output of your unit/system – do you have a mass balance analysis? Yes, we have both mass and energy balances for the system. To summarize, the outputs are biocrude oil and natural gas. The yield is based on the mass of dry solids in the feedstock. We do not dry anything, but this is the most accurate way to measure the feedstock. The system will produce oil with a mass of about 40% of the feedstock dry mass. The methane gas will be about 25% of the feedstock mass and the rest is carbon dioxide. *If a mass balance is available, please include below or attach as a separate document.*

Input material description and characteristics: The only requirement for the input material is that it must be made into a slurry of about 20% solids/80% water. The system will process essentially anything organic and is not sensitive to the feedstock—whether raw manure, digestate, agricultural residuals such as straw, etc.

For example: raw manure, digestate, screened digestate, suitable non-farm feedstocks, other.

Does the technology treat the full manure stream for a farm or a fraction of the stream? This depends entirely on the size of the system. There is no requirement for whether it processes a small portion or a total farm volume.

Do you consider this a mature system or ongoing farm development? It is still early in the commercialization.

Any weather constraints? Yes No The system should be covered, or if the climate is cold, it should be in a building. Hydrothermal systems are quite compact, so this does not require a large structure.

Any bedding constraints? Yes No We are not constrained by bedding but we prefer not to process sand unless most of the sand has been removed before our process.

Output material description and characteristics: The yield of oil and gas are given above. The other output is the water, which is the same as the input water—a passthrough, except that the output water is clear and sterile. It is even drinkable, though it has a small amount of ammonia which would preclude it from being generally potable. However, it is ideal for washdown.

Do the Outputs of the process have a resale market identified? Yes No The biocrude oil can be sold to a refinery, and this would also allow the producer to receive Federal credits for renewable fuels. The methane gas can be burned onsite either for heat or as a fuel for a generator.

If so, under what brand name or who is the contract with?

Is this process scalable and to what extent (top and bottom limits)? Yes No From a fraction of a ton per day to 25 tons per day of dry mass. Above that size we use multiple units, which has the additional benefit of redundancy. .

Do you have a known scaling factor? Yes No Not clear what this means. We can make any size in the range of the preceding question.

Does this technology require any air input? Yes No

Only a small amount of instrument air from a small compressor at about 60 psi.

What is the preferred air connection? Simple air hose or NPT fitting.

Does this technology require any water input? Yes No The feedstock slurry will be 80% water. Fresh water is also needed for startup and cooldown, and for washing and cleaning.

What is the preferred water connection? Normal residential or small commercial supply. Hose fittings are adequate except for the larger systems which may need a larger line. Pressure 40 to 60 psi.

Does this technology require any electrical input? Yes No Depending on the size of the system, will require 230 V 3-Phase or 460 V 3-Phase. Current service will also depend on size of system from 30 A to 100 A.

What is the preferred electrical connection? See previous response.

Does this technology require any mechanical input? Yes No System is skid-mounted and self-contained. Needs connections for feedstock supply, water, drain, and electrical. Needs tanks to receive biocrude oil, methane gas, and effluent water. If methane gas is burned onsite, then methane tank is just a small bladder to ensure uninterrupted flow.

What is the preferred mechanical connection? See above—system is self-contained except for the connections noted.

Does this system require any special plumbing? Yes No All connections are described above.

Does this system require any special foundations or pads? Yes No Each skid may weight up to 10,000 pounds. The number of skids will depend on the size of the system. The pad must be capable of this load.

Do you consider this technology part of a larger system that you provide? Yes No We can supply the genset if it is desired to burn the methane gas onsite to produce electricity.

Does your system require any other components that you do not provide or are not included in your proposal? Yes No Depending on the feedstock, we may need to supply equipment to produce the 20% slurry. This could require grinding, cutting, macerating, mixing, or other processes.

How is the system delivered to the site? Equipment is skid-mount and delivered by flatbed truck. If the system is shipped overseas or if further protection is needed it can be fabricated to fit into a standard shipping container.

Is this system portable or configured in such a way that it could be easily transported for use in several locations?

Yes No Smaller systems can be moved. Larger systems can also be moved, since they are shipped to site as skid-mount units. However, if the system is intended to serve multiple locations, then this should be identified at the outset so the system can be built onto a flatbed truck or into a container.

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

There is a very small amount of H₂S produced. For all but the largest systems this can be safely vented through a small roof pipe. For larger systems it should be routed to an H₂S sponge.

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

How is the system controlled and what are the components and capabilities of the control system? The entire system is automated and controlled by an industrial Programmable Logic Controller (PLC). Standard PLCs from either Honeywell or Allen Bradley (Rockwell) are used. The system can send alerts for any unusual condition either by cell phone or by internet.

What is the usable life of the system? 20 to 30 years.

What is the salvage value at the end of the usable life? System contains several pressure vessels which may have value; otherwise is scrap value. All construction is from grade 316 Stainless Steel, so will have some value for metals.

What is the educational and technical level of competence for the operation of the system? Requires technician with high-pressure experience. Engineering degree would also be desirable.

What level of maintenance is required for the system? The system uses a high-pressure pump, which will require annual maintenance for valves and seals. The gasification section uses a catalyst which will be replaced every two years. Pressure control valves may require annual maintenance.

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

A guard bed is provided to protect the catalyst, and guard bed must be changed every six months.

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 type="checkbox"/>
591	Amendments for the Treatment of Agricultural Waste	<input type="checkbox"/>
366	Anaerobic Digester	<input 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 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 type="checkbox"/>
629	Waste Treatment	<input type="checkbox"/>
359	Waste Treatment Lagoon	<input type="checkbox"/>
	Conversion of wet waste to fuels (Waste-to-Energy)	<input checked="" type="checkbox"/>
		<input type="checkbox"/>

Can you provide an estimate of the capital required for the installation of this technology? Depends on the size, from \$500,000 to \$20,000,000. This does not include site work such as a pad or building.

Please include all components and designate if provided by you or others.

Can you provide an estimate of the operational costs required for this technology? Depending on size of system, may require only part time person on one shift up to multiple persons on multiple shifts per day. Typically O&M will be about 2% of the capital cost.

Please include all costs and designate if provided by you or others.

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

Is the system available for lease? Yes No Can be arranged, but Genifuel does not directly provide lease financing.

What sort of warrantee or guarantee do you provide with this technology? One year on materials and workmanship. Individual components (e.g. pumps) are warranted by the manufacturer of that item.

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

Explain how this system is unique or transformative and how does it improve upon or go beyond other technologies that are currently available. The system can completely eliminate wet wastes while providing renewable fuels. The system is highly efficient, capturing more than 85% of the energy in the feedstock and needing 15% of the energy to operate the system. No other waste-to-energy system is even close to these figures of merit.

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:	
Company Location:	
Contact Name:	
Contact Information:	

Reference 2

Company Name:	
Company Location:	
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?

The current focus for Genifuel systems is agricultural applications and wastewater processing for the disposal of sewage sludge while producing high-quality crude oil and methane gas.