TECHNOLOGY PROVIDER
TECHNOLOGY INFORMATION REQUEST

Technology/Service:	IEC Covers – Gas Storage		
Information by:	Dave Anderson	**Date:**	May 7, 2020

COMPANY INFORMATION

Company:	Industrial and Environmental Concepts, Inc. (IEC)		
Phone:	Office (952) 829-0731 cell (952) 240-3321	**Web Site:**	www.ieccovers.com
Address:	21390 Heywood Ave	**City:**	Lakeville
State:	MN	**Zip Code:**	55044

TECHNICAL CONTACT

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DEMONSTRATION SITE CONTACT

Site Name:	To be determined
Contact:	Dave Anderson
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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?

- Floating Gas Collection and Storage Covers
- Dual-Membrane Gasholders (tank-mounted and freestanding units available)
- Floating Modular covers
- Supported Tank Covers
- Liners
- Floating Baffle Systems

(all utilizing geomembranes)

Please provide a brief (1-2 sentence) description and a full description of this technology.

Attach pages or separate document if necessary.

Summary:

- Floating Gas collection covers are installed over manure basins to collect bio- gas produced by anaerobic processes.
- Dual-Membrane Gasholders are used to store excess biogas for later use.
- Modular Covers are primarily used to control odors but can also help retain heat (they are insulated).
- Supported Tank Covers can be used for a number of reasons and usually apply when there are large water level fluctuations in a tank. They can be used for odor control, and to prevent entry of rainwater.
- Liners are used primarily for containment (environmental, ground-water protection)
- Baffles are used to direct flow in a basin to prevent short-circuiting, increase HRT, or sometimes as a divider to separate a single basin into multiple treatment cells.

Full description:

- **Floating Gas-Collection Covers** – Usually consists of a single impermeable membrane for collection of biogas produced in an anaerobic basin (lagoon, pond, or tank). Depending on the climate and process requirements, the covers may also be insulated to help maintain the temperate required for efficient biological activity. The covers are typically operated under a slight vacuum (<1/2"H2O is typical) to continuously remove biogas as it is generated. A ballast weight system is included to provide protection from wind uplift and to aid in directing collected rainwater to surface pumps for removal. These covers can be anchored in a trench on the perimeter of an earthen lagoon, or via mechanical batten system to a concrete ring wall if one is in place. On steel and concrete tanks, they are mechanically attached using a mechanical battening system. Hatches, sampling ports, and other features desired by the end-user can typically be provided anywhere on the cover.

- **Dual-Membrane Gasholders** - Gas storage vessels are designed for small or large gas volume applications. Small storage vessels are available as cylinders, easily anchored in the ground with variable diameter and lengths. A blower is provided to control pressure on vessel walls. For large volume applications, a free-standing gas storage dome is available, designed and mounted on a concrete foundation. Domes are either three quarter or spherical form. Continuously operated blowers ensure the required operating pressure is maintained.

- **Floating Modular Covers** – Consist of insulated casings (or panels/modules) fully wrapped and sealed with impermeable geomembrane. Casings are manufactured in a controlled environment at the plant and delivered to the site ready for installation. Casings are linked together with a proprietary fastening system which permits quick installation. The cover is usually anchored to the perimeter of an earthen basin using earth anchors or Deadman anchor blocks with a chain and/or cable system. Ballast is included on the cover and at the perimeter to protect from wind uplift. This cover system can be removed in whole or in part to allow for owner access.

- **Supported Tank Covers** – Consist of an impermeable geomembrane supported above the liquid surface. The support system varies by application and could include one or more of the following elements: a stainless-steel cable system, strapping, center support column, or aluminum or FRP members. The covers are usually tensioned on the perimeter to provide a taught structure that protects from wind exposure and allows drainage of rain and snow.

- **Liners** - Liners are primarily used for containment; for environmental protection including protection of groundwater. The design of Geomembrane liner systems can vary greatly depending on the application, location, and various regulations. There are a variety of materials available. Single and double lined basins are both common. Sub-liner, and inter-liner (between layers) drainage and venting is also an important consideration. There are a variety of products available to accommodate these requirements.

- **Baffles** – Consist of an impermeable membrane curtain suspended in the basin contents and supported at the liquid surface with an encapsulated flotation log/boom. The curtains usually extend to the basin floor and have an opening at one end to permit flow to the other side. Multiple baffles can be installed in a basin to create a serpentine flow pattern.

Please explain how this technology will improve water quality and/or air quality by one or more of the following:

1. **Reducing the nutrient content, organic strength, and/or pathogen levels of manure and agricultural waste.**
2. **Reducing odors and gaseous emissions:** Gas emissions are managed via flaring, scrubbing, and cleaning for reuse. Desulfurization nets are also part of the internal structure of the systems. H2S is contained in the gas-tight vessel as opposed to open air systems
   Modular covers reduce odors by preventing volatilization from the liquid surface without need for gas-recovery.
3. **Facilitating desirable waste handling and storage:** Accumulated sludge in an anaerobic basin can be removed and used for injection or surface spreading. These are the most common applications**.**
4. **Producing value added byproducts that facilitate manure and waste utilization.** Nutrient value is improved for crops. Also, on-site storage of biogas reduces gaseous emissions on dairy farms by storing biogas in leak-proof vessels or domes prior to final processing of the gas to produce value added byproducts, such as compressed natural gas (CNG) for use as transportation fuel.

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

United States and Canada

Location of farm(s)?

United States and Canada

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

200-50,000 milking head

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

The input to a gas storage system is biogas produced from anaerobic digestion of manure in lagoons or anaerobic digesters. The input and output material compositions and volumes are the same, with no change in system mass balance. The bio-gas input/production is largely based upon heat and quality of bio-mass fed into the system. All systems vary depending upon substrate, upstream solids removal and feed characteristics for the animal generating the waste.

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

The input is biogas derived from anaerobic digestion of cow manure. See previous response.

Please provide the expected performance of this technology related to the following:

1. Changes in form or handling characteristics: Covered basin creates anaerobic environment. Waste is broken down to a much higher degree in a shorter time period. Bio-accumulation of nutrients is improved by the process. (Covered basin)
2. Nutrient fate or end use projections: Nutrients are modified, for example nitrates are reduced to lower nitrogen forms.
3. Macro-nutrient reductions or transformations: Complex organics are broken down
4. Pathogen reductions or elimination: Pathogens are reduced
5. Air emissions (including gaseous ammonia, hydrogen sulfide, and volatile organic compounds): Biogas from an anerobic digester or lagoon is captured and stored in a gas storage system (when installed) for additional processing. The storage system is designed to secure the gas in leak tight containers to eliminate emissions. The process is part of manure management system and supplemental biogas effluent processing into value-added products such as RNG.

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

Mature system. IEC makes innovations every year in design which benefits the producer

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

Installations cannot be conducted during wet (rain and snow) and windy conditions or when temperatures are below 40 degrees F.

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

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.

The output of the storage system is biogas with the same material characteristics and volume as the input gas

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?

The output biogas can be further processed produce value added byproducts, such as compressed natural gas (CNG) for use as transportation fuel.

Please provide any alternative uses for the byproducts produced by this technology.

Stored biogas can be used to generate electricity to power on-site dairy operations and supply backup power as needed.

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

Wide range of storage capacity from 1,700 to 1,000,000 cu. feet

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

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.

None

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

No

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.

None

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

Electricity to run the blower motors.

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

Standard three-phase power supply

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

No

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

None

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

No

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

Cement pad foundation for the dome storage systems (freestanding dual-membrane gasholders).

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

No

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

No

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

Components are delivered on semi and flatbed trucks

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.*

No

Does this technology negatively impact another critical area or have other regulated characteristics (i.e. emissions, sound, odor)? If so, what are these impacts and what mitigation measures have been if required by state or local agencies?
If so, please describe the recommended means of mitigating these impacts.

No unusable or hazardous byproducts of this process requiring mitigation or monitoring measures.

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

None required

What equipment, time and resources are required for monitoring this technology and what equipment is included for monitoring this technology?

The storage vessels are maintenance free.

What equipment, time and resources are required to control this technology and what equipment is included for controlling this technology?

No controls or operational requirements needed for monitoring.

What is the usable life of the system?

Varies by product, application, environmental exposures, and operator care – on average, 15 years

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

None

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

Low

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.*

Little to no maintenance is 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.

No

Which of these NRCS codes would this 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	☐
		☐
		☐
		☐

Please provide an estimated installed capital cost for this technology and indicate the model, cow number or volume that this cost applies to. *Please include all components and designate if provided by you or others.*

4 laborers for 2-4 days and a crane for 1 day (this is typical only to the dual-membrane gas holders). Other products vary greatly depending on the size of the project and would need to be examined on a project by project basis.

Please provide an estimated annual operation cost for this technology and indicate the model, cow number or volume that this cost applies to. *Please include all costs and designate if provided by you or others.*

Minimal operational costs to run electric blower motor

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

No

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

No

What sort of warrantee or guarantee do you provide with this technology? (9.a) *Do you provide any performance guarantees or strictly defects in parts and materials?*

Standard 1 year workmanship, 10 year pro-rated material warranty. Extended terms are available.

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

The cost is 25-35% less than comparable hard dome systems

Please provide the recommended record keeping procedures for end users of this technology.

The monitoring and recoding of data and system performance is fully automated.

Can you provide independent, verifiable data demonstrating results for the use of this technology in other similar situations and locations? Would you be willing to provide this data in order to qualify for NRCS funding?

Yes, the data is available and can be provided as required for NRCS funding

If information is provided related to the previous question, please provide the credentials of the individual collecting the data and analyzing the results along with disclosure of potential conflicts of interest.

Validation of the data and credentials can be made available as well as disclosure of any potential conflicts of interests.

Newtrient has developed a third-party evaluation protocol that can be used in conjunction with a local university or state extension agency to evaluate technologies in a way that will meet the NRCS requirements. Please contact mstoerm@newtrient.com if you are interested in contracting for this service.

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:	Franc Environmental
Company Location:	Warminster, PA
Contact Name:	Tom Ferrara
Contact Information:	T2@FrancEnviro.com

Reference 2

Company Name:	McCain Foods
Company Location:	United States and Canada
Contact Name:	Peter Cormier
Contact Information:	peter.cormier@mccain.com

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?

IEC has solely specialized in covers and liners since 1993. The EPA pond design guidelines include IEC's insulated modular covers as an approved wastewater solution. IEC has over 1400 installations in 19 countries. IEC is recipient of multiple design and quality achievement awards.