ENGINEERED STORAGE PRODUCTS COMPANY

AN ANAEROBIC DIGESTER PARTNERSHIP

A report based on Engineered Storage Products Company's 25 years of digester tank design and installation coordination.

Livestock producers are seeking new ways to deal with manure from their operations in a safe, efficient and sustainable way. Among the options being considered is the use of an anaerobic digester.



An anaerobic digester is a completely closed (oxygen free) system that receives and biologically treats manure with naturally occurring organisms.

A successful system should be easy to operate, cost effective and characterized by consistent and significant reduction in volatile solids, production of methane rich biogas, and discharge an effluent with less odor, pathogenic organisms and weed seeds than was present in the incoming waste. In a successful system, no additives or additional organisms are required.

Biogas production is best suited for farms that handle large amounts of manure as a liquid, slurry, or semi-solid with little or no bedding added. Biogas systems require a financial investment and management responsibility. The system must be designed by an experienced consultant, who is well versed with the requirements associated with biogas production.

A typical digester system will have a retention time of 20 days. To size a digester, take the daily manure production in your operation and multiply by 20. Research has shown that an above ground mixed reactor similar to tanks designed by Engineered Storage Products Company (ESPC), is going to be more efficient than a plug flow system. Listed below are expected production values:

	DAIRY	BEEF	SWINE
Animal weight	1400	850	150
Biogas ft³/day/animal	80	37	6.5
Btu/day/animal	44,000	20,625	4,100
KWH/day*/animal	3.42	1.61	.32

** Assumes 28% conversion efficiency 12 ft³ CH_4 = 1 KWH*

A SUCCESSFUL TEAM OF PARTNERS

• Engineering Consultant
• Engineered Storage Products Company
• Authorized ESPC dealers
• Additional Vendors

The selection of an engineering consultant or developer is a critical decision. The farm owner often relies on the consultant or developer to manage the process of transforming a feasible idea into a functional facility. In addition to a consultant that designs the digester system, the owner may need to team with other equipment vendors.



Have your engineering consultant call your local authorized ESPC dealer today for a price quotation for a digester tank.

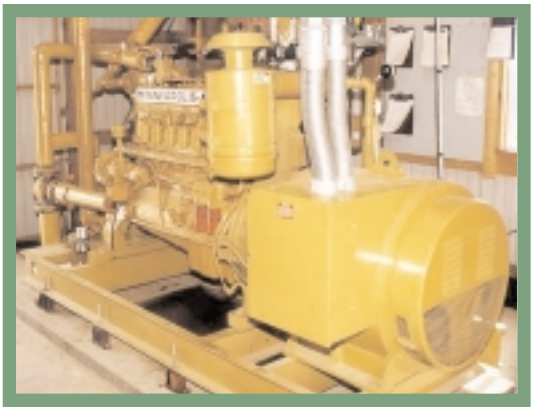
The largest component of a digester system is the digester tank. ESPC has been manufacturing and installing glass fused to steel structures since 1949. They have been designing tanks used in digester systems for more than 25 years. Most ESPC dealers can also supply reception pit pumps, manure storage structures, manure spreader tanks, and solids separators. An Engineered Storage Products dealer can also complete the installation of many of the digester components. With these partners in mind, a farm owner can determine his or her desired role in the project development process.

Anaerobic Digester System Benefits



Digester systems offer potential economic and non-economic benefits. Actual benefits will vary from farm-to-farm. Recovered biogas can be utilized in a variety of ways.

Biogas is approximately 60 percent methane and 40% carbon dioxide, with a heating value of approximately 600 Btu/ft^3. Gas of this quality can be used to generate electricity, as fuel for a boiler, space heater, or refrigeration equipment; or it may be directly combusted as a cooking and lighting fuel. Most equipment that uses natural gas, propane, or butane fuels can be modified to operate on biogas.



Electricity can be generated for on-farm use or for sale to the local electric utility. The most common technology for generating electricity is an internal combustion engine with an induction generator. The predicted biogas production rate and the operating plan are used to size the electricity generating equipment.

For some dairies, this may be the most cost effective option for biogas utilization. Other energy use options may exist. For example, a nearby greenhouse could be heated with the bio-gas, and carbon dioxide from the heater exhaust could be used to enhance plant growth. These options need to be evaluated on a case-by-case basis.



A system, which includes equipment to remove course, suspended solids from the liquid, may sell digested fiber for compost. Recovered digested solids may be used for animal bedding offsetting the cost of bedding purchases. Using solids separation equipment will reduce storage volume by 10 to 20% and the pumpability of the digested liquid is greatly improved.

Digester systems will greatly reduce the viability of seeds found in the waste stream. Consequently, there is the potential that less herbicide will need to be purchased.

A market is developing in which a digester owner may be able to sell pollution credits. The process would involve the sale of CO^2 credits associated with the production of electricity from renewable energy sources.



Research has shown that anaerobic digestion does not lower the total amount of nitrogen, phosphorus and potassium in the manure but does increase the amount of ammonia nitrogen. The manure effluent will have a higher nutrient availability and plant uptake may be improved with digestion. Fertilizer purchases are expected to be reduced and crop yields possibly improved.

Perhaps the greatest potential indirect economic benefit comes from the reduction in risk of legal action and forced outright closure. Farm employees as well as neighbors would prefer not to deal with odors associated with manure management. After digestion, compounds, which usually produce odors, are greatly reduced. Digester systems, properly designed and operated, significantly reduce the odors associated with manure storage and distribution.

Also depending on the operating conditions, pathogenic organisms may be reduced by as much as 90%.

TYPICAL BIOGAS SYSTEM COMPONENTS

Biogas technology is a manure management tool that promotes the production, recovery and use of biogas as an energy source. Selecting the proper biogas system design and components is the key to long term operation and performance.

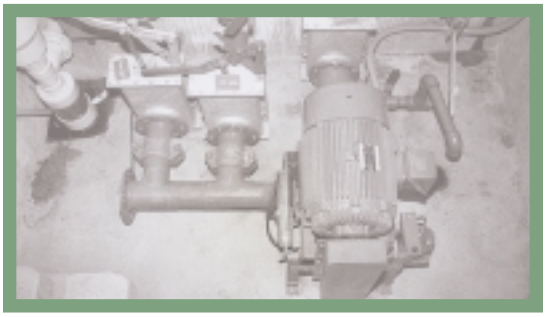
A typical biogas system consists of the following components:



Manure Collection Pumps and Reception Pit



Hot Water Heater and Controls



Digester Agitation System



Digester Tank



Complete Anaerobic Digester System



Engine Generator

With more than 25 years of liquid manure storage and handling experience, we are ready to partner with you and your engineering design consultant. Contact your local authorized ESPC dealer for more information on how to use our glass-fused-to-steel tanks in your digester system.

ENGINEERED STORAGE PRODUCTS COMPANY
815-756-1551
DeKalb, Illinois 60115
www.slurrystore.com

For more information on engineering design consultants and other key digester equipment vendors, go to http://www.epa.gov/agstar/tech/index.html