

SiENERGY
Ltd

promoting energy
production
simply & safely



Anaerobic Digestion



Farm Based Biofuel Production
www.sienergy.co.uk

Promoting self-sufficiency in energy production, simply and safely



The degradation of organic material is a natural process that happens all around us every day by micro bacteria. Anaerobic digestion is the harnessing of this natural process (under controlled conditions) to produce biogas (mainly methane CH_4) that can be captured and used to produce

heat and electricity. The process is done on a continuous flow with the standard retention time being from 20- 30 days. The process can be used to treat a variety of organic materials including, animal slurries, food wastes, and sludge's and energy crops grown for the biogas plant.





Ease of Construction

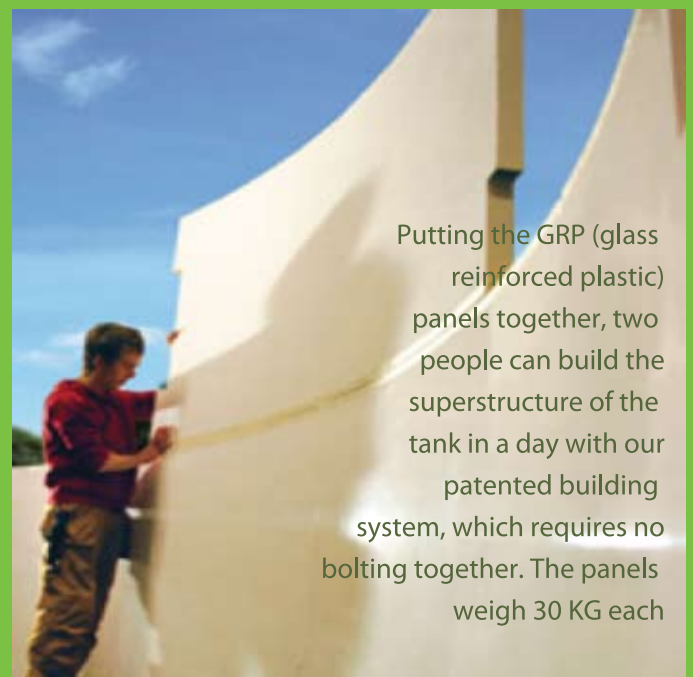
The system is built in module form where reactors can be added as extra capacity is needed, this means that the system has the potential to grow organically and is flexible to any change to the amount of feedstock available. The advantage of this is that there are less capital costs at the start up stage and your business can grow without fear of out growing your existing facility.

The plant consists of a technical control room and one or more reactor tanks that are buried in the ground. Insulated tank modules and PVC-sheets are supplied flat packed, and the technical control room is housed in a standard ISO container with prefabricated equipment inside which include manure pump, gas pan or generator (CHP), a PLC control system and hot water system for district heating.

The tanks reactors come in sizes 130 and 170m³ gross, both have a diameter of 7 meters, while the height is 3.6 and 4.8 meters respectively. The top of the digester is flexible and provides for temporary gas storage and pressure equalisation through the patented water lock system. The highest point is about 1.5 meters above the ground. The tanks can be built above and below the ground.

The reactor tank consists of a moulded floor, modules, two PVC textiles and a submersible agitator mounted on the tank. A 130m³ reactor consists of 30 modules, each weighing 30 kg. The modules can be easily assembled by two people. The reactor is built into the ground, a PVC sheet is used to line the inside of the panels which is water and gas tight.

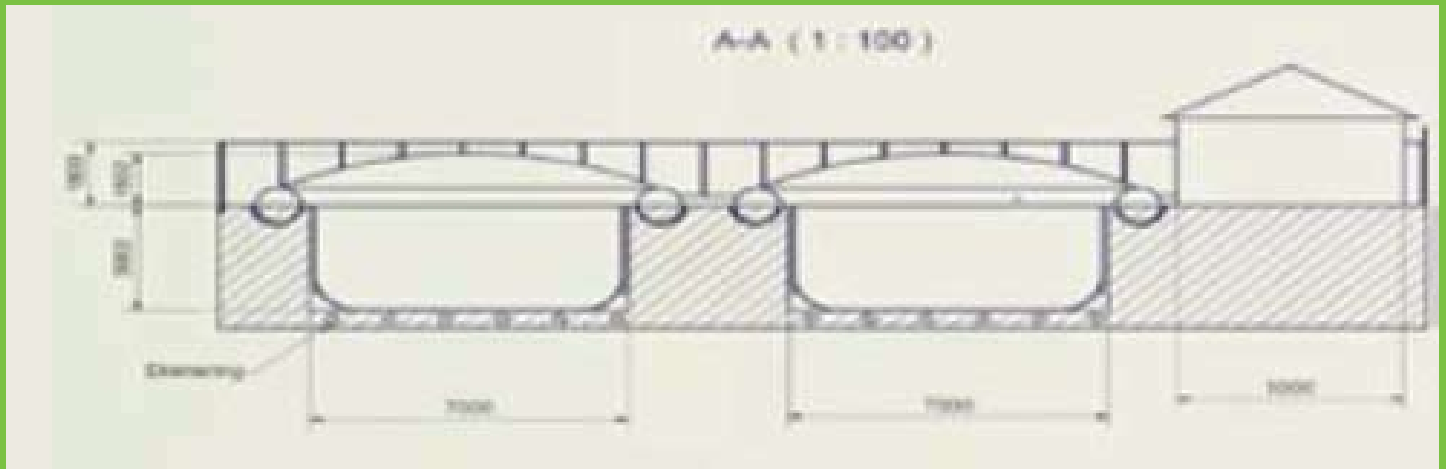
The system can be built to fully integrate with storage facilities on the farm due to its small foot print and module nature, the benefit of this is that it keeps capital costs to a minimum at the start up stage. Site preparation consists of levelling and insulating the ground with standard



Putting the GRP (glass reinforced plastic) panels together, two people can build the superstructure of the tank in a day with our patented building system, which requires no bolting together. The panels weigh 30 KG each

polystyrene, followed by a slab of flat concrete poured directly on to the insulated ground with standard heating pipes built into the pod. It takes little site preparation, little formwork for the concrete and little labour for the build.

System Diagram



Security



High security is achieved through a safe gas containment system and security vent system from the patented water lock system. Through building the tank in the ground it is protected from damage. All components of the tank are built to European safety standards for biogas plants.

Picture of the inside of the control container

The plant produces biogas from manure and organic waste, the biogas consists of approximately 60% methane (CH₄). Biogas is a flexible energy carrier which can be utilised in many different ways, e.g. electrical power generation and heating. Another alternative is the up grading of the biogas to 98% methane which then has the same properties as natural gas (LPG), this can then be injected into the natural gas grid or even used to power cars after slight modifications to the engine. Equipment for making use of the gas like combined heat and power (CHP) systems or other



gas conversion systems are based on each customer's individual need.

Services offered by SI Energy

Feasibility Study

Visit to site, assessment of existing feedstocks, calculation of gas yields and potential energy output from plant.

Pre consultation

To include steps needed to get planning permission where applicable, size of plant i.e. number of tanks needed, electrical connection and heat connection.

Planning

The drawing up and submission of all documents required for planning, meeting with planners on your behalf and ongoing maintenance of application to ensure it is accepted and passed by the local authority.

Construction and commissioning of anaerobic digestion plant

Instillation of the anaerobic digestion plant, this includes the construction phase and commissioning the plant to get up to optimum biogas production in as short a time as possible.

Continued monitoring of anaerobic digestion plant.

SI Energy can monitor the vital parameters of the anaerobic digestion plant through an internet connection pre installed into the control container. This means we can view the daily parameters and anticipate any technical difficulties that might arise from this data.

Environmental Benefits



Farm based biogas production has multiple environmental benefits such as a reduction in greenhouse gas emissions, through the use of the methane in the biogas and a reduction in the nitrous oxide emissions from the digestate

both of which are potent greenhouse gasses. The digestate is a more valuable fertiliser and a lot less likely to damage the environment as the digestate process stabilises the digestate. Biogas also reduces the need to import expensive fossil fuels, and is environmentally sustainable.

Integration into landscape

Due to its small footprint the biogas plant integrates into landscape naturally, due to its ability to locate in the environs of the farm and being mostly below ground, the ISO container can be painted the colour of existing buildings on the farm to blend into the background, and in certain areas may mitigate the need for full planning permission.

A Profitable Investment

New and innovative technology makes it more interesting to invest in biogas for anyone who has access to manure and/or other organic waste. This new technology makes investment profitable at the farm scale level. Access to affordable self-produced energy and improved fertilizer and the ability to export surplus energy makes this a worthwhile investment. In the UK one can avail of the feed in tariff for renewable energy produced. In the Republic of Ireland one can avail of the 30% capital grant being offered by Sustainable Energy Ireland SEI and then a feed in tariff guaranteed for the next 15 years.

Advantages of the system

Properties	Benefits	Advantages
Buried tanks	Increased insulation, less heating costs	Anaerobic digestion is a win
Water lock	Higher security	Displace your energy needs with cheaper energy, and sell the surplus surplus
PVC sheets	Less visually intrusive	Excess heat can be used to heat farm dwelling, parlours, pig units, grain
Double PVC sheet on top incl air insulation	Safe and easy solution	Extra income stream by selling heat to nearby buildings
Module built components	Regulates pressure within the reactor	Better nutrient availability from digestate
Standardised control room (prefabricated)	Long durability	Save money by better use of a by product to displace artificial fertiliser
Use of more reactors instead of one large reactor	Safe and easy solution	Reduced odour from digestate
Standardised system	Detachable and low cost	Better sanitisation through treatment of raw slurries
	Increases insulation , lower running costs	Help application for IPPC licence through treatment and stabilisation of slurries
	Straight forward construction	
	Rational production and lower costs	
	Easy on site connection	
	Just have to plumb in pipes and power	
	Allows for low capital costs at start up	
	Easy to increase size if needed	
	Easier management	
	Reduced costs in preplanning	
	Plant owners may share relevant experiences	
	Reduced costs handed on to buyers	