

# Harnessing the Power of Anaerobic Digestion: *Part I*

Canadian Pork Council - Cedric MacLeod



Clear-Green Environmental Inc.

*Clear-Green Environmental Inc., recently fired the first hog manure anaerobic digester in Saskatchewan at the PIC facility in Cudworth*

These days, more and more agricultural publications are featuring articles on anaerobic digestion technology. This is a process that allows livestock producers to generate electricity and heat using manure from the farm, and is a concept far from new in the agricultural sector. A push on these systems in the 1970s saw numerous sites established for this manure treatment technology, but few remain. At the time, it was felt that these systems were too intricate and finicky, and required far more time for monitoring than producers were willing to spend.

New systems, however, are being designed with these challenges in mind. Partnerships between manure “treaters”, livestock producers, and power companies allow pork producers to capture the benefits of the treatment technology without a heavy time burden for system maintenance.

The concept of anaerobic digestion is fairly simple. Manure is warmed and mixed in a tank that is free of oxygen, or *anaerobic*. In these warm conditions, bacteria become very active. They will begin to *digest* carbon, most likely the feed carbon not used in the animal digestive system, which has found its way into the manure stream. In the case of

cattle operations, this carbon may also consist of bedding materials, such as straw or wood chips. The goal of anaerobic digestion is to produce *methane*, a combustible greenhouse gas, and a byproduct of having bacteria consume manure carbon under oxygen-limited conditions.

## Power and Heat Production

Diesel engines are capable of running on a mixture of the methane produced in a digester, and diesel fuel, with some minor modifications. A mix of 10 per cent diesel and 90 per cent methane gas is working well for most systems. These engines are coupled with an industrial generator to turn methane and diesel into power and heat. Oil fields have been using methane-fired generators for years to supply power to remote locations, so the technology has been well proven.

## System Benefits

Manure odour produced during storage generally results from the release of carbon compounds. This is the same carbon that will be used to produce methane in a digestion system. As such, digested manure produces very little odour and in many cases, these systems are used as an odour reduction measure, with electricity as a nice byproduct bonus.



*BIOGEM Power Systems Inc. has been producing power and heat from a multiple manure source digester in Iron Creek, AB for two years*

In addition, by using a heat exchanger, waste heat from the engine can be used to heat farm and home buildings, as well as the digester itself. As methane is a greenhouse gas, and digesters allow for its capture and use, there may also be opportunities to sell carbon credits. It is still unknown exactly how much income may be generated from selling these credits, but the option will likely exist.

## System Challenges

Digesters *will not* solve nutrient management issues. Carbon is the only nutrient consumed in a digester, so nitrogen and phosphorus concentrations are the same for raw and digested manure. However, separation systems can be easily integrated into a digestion unit to capture phosphorus for other on or off-farm uses. Selling electricity into the local power grid is currently fairly difficult and yields little cash in most provinces. However, as green energy portfolios become more prominent in Canada, this is expected to change.

*DGH Engineering Ltd., fired the first Manitoba digester system in February 2004. Both heat and energy production are planned for the hog finishing operation in Teulon*

Anaerobic manure digesters reduce odour, generate heat and electricity and reduce greenhouse gas production. For an age old piece of technology, that's not a bad start.

Additional project pictures, information and contact info are available upon request.

