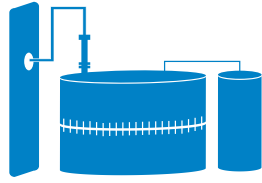


# BIODIGESTER



## 1 What is a biodigester?

A biodigester is like a mechanical stomach. It is fed with organic material, which is broken down (decomposed) by micro-organisms (bacteria) in an oxygen-free (anaerobic) environment to produce a renewable energy called biogas (methane and carbon dioxide) and other material that is mainly used as a fertilizer.



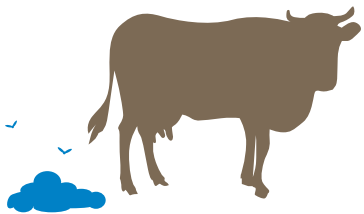
## 7 Do biodigesters stink?

The methane produced by a biodigester has no odour. However, biodigesters can produce hydrogen sulphide, which smells like rotten eggs. This biodigester has a filter that removes hydrogen sulphide from the gas.

Unless the biodigester is opened to add manure or other biodigestible material, or for repairs, there should be little odour associated with its operation.



## 2 What materials can the biodigester process? What is fed into this one?



Any organic material can be used to feed a biodigester, but some materials work better than others because they are easier for bacteria to digest. This anaerobic digester is fed animal manure from farm animals.

## 8 What is the purpose of the biodigester at the Canada Agriculture and Food Museum?

This custom-built biodigester is an integral part of the Canada Science and Technology Museums Corporation's Let's Talk Energy initiative at the Canada Agriculture and Food Museum.

The biodigester will provide Museum visitors with the opportunity to learn about leading-edge technology resulting from Canadian-based research and development.



## 3 What is the production capacity of this biodigester?

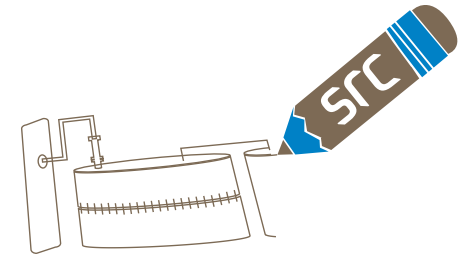
The digester has been designed to produce about five cubic metres (25 full bath tubs or 2 large garbage bags per hour) per day of biogas (60% methane, 39% carbon dioxide), at full capacity with good organic material. The biogas produced over one week is the equivalent of 23 litres of gasoline.



**60%** Methane  
**39%** Carbon Dioxide

## 9 Who designed this biodigester?

A team of energy and bioprocessing specialists at the Saskatchewan Research Council (SRC) designed and manufactured the biodigester as a technology demonstration.



## 4 How is the biogas used?

The renewable biogas will be used as a source of energy for demonstration purposes. Because the carbon dioxide (CO<sub>2</sub>) produced is from a renewable resource, it is considered climate change neutral, as the amount of CO<sub>2</sub> entering the atmosphere isn't increasing.



## 10 What are the benefits of using a biodigester?

A biodigester produces biogas, which is a renewable resource that can be used as a substitute or replacement for natural gas. Biogas can be used to reduce on-farm costs or to generate revenue streams by:

- Allowing farmers to produce their own heat by feeding the biogas into the natural gas system
- Powering an electrical generator to provide electricity on the farm
- Using the remaining product as organic fertilizer on the farm or selling it



## 5 How does the biodigester process the material? How does a biodigester work?

In the biodigester, a team of naturally occurring microbes (micro-organisms) convert the organic material. Different microbes perform the following basic steps:



1. The first set of microbes converts the organic material into water-soluble material (dissolves in water) that other microbes can access.
2. The second set of microbes takes the soluble materials and converts them to organic acids.
3. The third set takes the various organic acids and converts them to acetic acid (vinegar).
4. The fourth set of microbes converts the acetic acid to methane gas.
5. The remaining material is a disease-free, nutrient-rich natural fertilizer. Other products such as ammonia and carbon dioxide are also formed.

## 11 Are biodigesters affordable or economical for producers?

There are different factors that determine if a biodigester operation is affordable or economical:

- How much farmers are paid by government incentives or jurisdictional prices for the electricity produced from the biogas (known as the "feed-in tariff" paid to the farmers by local electrical utilities)
- Amount of displaced natural gas
- Price of bio-methane for the natural gas system

In Europe, biodigesters have been economical for many years. (In Canada, the majority of biodigesters operating economically are in Ontario and Quebec.)



## 6 How long does it take to process the material?

The length of digestion depends on the amount of organic material fed to the biodigester. On average, the material spends 27 days in the digester.



## 12 What is the history of SRC's expertise in this area? Have they built biodigesters before?

SRC has worked on a project that involves processed organic waste at a meat processing facility. The methane generated is used as a fuel for internal combustion engines that generate electricity used by the facility and is sold to the local utility company.

