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## BIOGAS SYSTEMS

### What is a biogas system?

A biogas system consists of:

- an anaerobic digestion tank or vessel
- a biogas collection or management system, often a storage bubble
- a biogas utilization system, such as a generator, and
- a digestate management and storage system, often a storage tank for liquids. Digestate is the material left after the biogas has been produced.

### What is anaerobic digestion?

Anaerobic digestion is a biological process in which micro-organisms break down organic matter like manure, crops, crop residues and food processing waste. This process occurs in the absence of oxygen and results in the release of biogas.

### What is biogas?

Biogas is a combination of methane and carbon dioxide. Biogas can be used like natural gas as a fuel in electrical generators, engines, boilers and burners.

### What's left in the tank once the process is complete?

Digestate is what's left once the organic material has been "digested". Once carbon has been converted to methane or carbon dioxide, the organic material becomes more liquid in nature. This liquid digestate contains all of the agricultural nutrients (such as nitrogen and phosphorus) that were present in the original organic material.

**Do all the biogas systems operate in the same way?**

While the basic operating principle remains the same, there are different types of anaerobic digester technologies based on the type of material handled, the operating temperature and the end use of the biogas.

**What materials can be used in a biogas system?**

Biogas systems can use both solid and liquid organic materials, including: manure, crops, crop residues and food processing waste material.

**How is electricity produced using biogas?**

Typically an operator would use biogas to run an internal combustion engine to power an electrical generator, which produces the electricity.

**Where does a “co-gen” system fit in?**

A co-generation or “co-gen” system is an internal combustion engine fitted with an electrical generator as well as a system to capture heat. Just as a radiator captures the excess heat from a car engine, a co-gen system captures heat from the engine for further use.

**What are the environmental benefits of a biogas system?**

Energy from biogas is a green or renewable energy, and its production reduces greenhouse gas emissions by reducing reliance on fossil fuels. In addition, biogas systems reduce greenhouse gas emissions by consuming methane produced from stored manure. Methane is twenty-one times more potent than carbon dioxide in causing global warming. The management of the digestate from the biogas system may also reduce emissions compared to the conventional management of manure or other input materials.

Adopting a biogas system also reduces the risk of contaminating ground or surface water as a result of the unintentional movement of pathogens and nutrients from manure run-off. Several studies show that harmful pathogens like E.coli bacteria are considerably reduced using this technology.

Biogas systems also reduce the odour in manure or other input materials by covering the manure storage tank, breaking down odour-causing compounds, as well as destroying the bacteria that cause odours.

**Do biogas systems use only manure?**

No. Manure is definitely one of the best fits for biogas systems because it is consistent, it is produced on a daily basis, and it contains readily digested organic material. However in Ontario, digesters can successfully use food processing waste materials as an input. These materials are often challenging to dispose of in conventional waste management systems, such as landfills. In addition, when biogas systems are implemented at food processing facilities, the heat from the biogas system can be incorporated into food processing activities and byproducts can be used directly on-site.

**Can biogas systems reduce energy costs for agricultural and food producers?**

Agricultural and food producers can use the electricity produced from their biogas system to meet their operation's energy demands. In addition, they can sell excess electricity to the electrical grid. This can be an additional source of revenue for the operation. The excess heat from co-gen systems can also reduce heating costs for the operator in the house, the barn or the food processing facility.

Once carbon dioxide and hydrogen sulphide are removed, biogas can be added to natural gas lines. Purified biogas can also be used as fuel in specially-modified vehicles, although this type of vehicle is not yet common in Canada.

For questions about program details and updates, please contact the Agricultural Information Contact Centre at 1-877-424-1300 or [ag.info.omafra@ontario.ca](mailto:ag.info.omafra@ontario.ca)

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