

## **A smelly solution to the energy crisis**

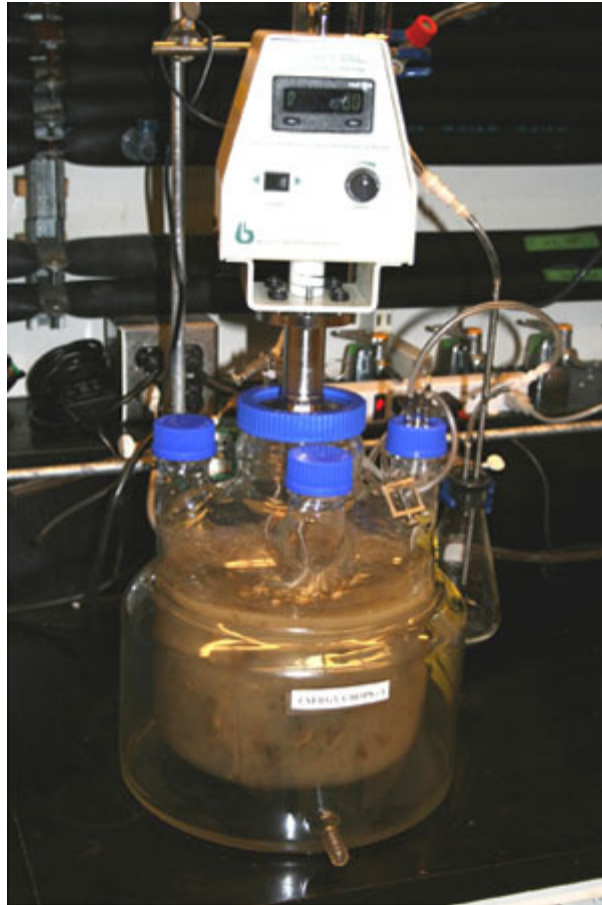
Source: National Research Council Canada

When you pass a cow field or garbage dump, you will surely detect a 'peculiar' odour. But hidden within those steaming manure piles and rotting kitchen scraps is something of great value — a clean source of energy.

Methane gas is created by the natural bacteria that break down organic wastes from crops, sewage, animal waste and garbage. Usually methane escapes into the atmosphere, where it becomes a greenhouse gas. But if collected and purified, methane can also be used as a source of energy. This type of energy is called biogas — a renewable resource that produces less greenhouse gas than fossil fuels.

The process for extracting biogas — called anaerobic digestion, or "AD" — is emerging as a green alternative for helping manage the growing volume of organic waste in landfills and wastewater treatment plants while at the same time creating a new source of electricity.

Anaerobic digestion is a natural process that involves the microbial degradation of organic material in the absence of air. It provides a way of treating organic waste that's far cleaner than traditional methods such as composting, landfilling or incinerating, while also creating biogas as a useful byproduct.



An anaerobic reactor used in the NRC labs.

"Once it has been properly purified, biogas can be used in the same way as any other natural gas, or can be used in modified engines that run electricity generators," says Dr. Serge Guiot, leader of the environmental bioengineering group at the NRC Biotechnology Research Institute (NRC-BRI).

Dr. Guiot leads an NRC project that will take the concept of AD on the road. His group is building a trailer-size mobile AD unit that will travel to sites that handle organic waste, including municipal wastewater treatment plants, pulp and paper mills, and landfill sites, to demonstrate how AD technology extracts methane from waste.

"We will be able to show how much methane could be extracted from these different sites on a large scale," says Dr. Guiot. "That in turn shows the benefit of this process over incinerating the waste or putting it in a landfill." The goal is to convince the people who manage these facilities that there's money in methane. They can use their own methane to create electricity, or they can sell it for profit. "The data should be convincing because it will be based on processing waste in a real context," says Dr. Guiot.



The NRC "Mobile Anaerobic Process Unit".

But methane faces a major hurdle to become our next green energy source. The short-term cost of anaerobic digestion is higher than traditional options such as landfilling, incinerating and composting. "For anaerobic digestion, you have to invest in processing and purifying the biogas, and the equipment to turn the methane into electricity," says Dr. Guiot. But when well managed, anaerobic digestion can be more cost effective in the long run.

Dr. Guiot says these types of demonstration projects give scientists the chance to play an important societal role that demonstrates the interaction of science, technology, society and the environment. "If we can make scientific knowledge more accessible to practitioners, we can help them to make good decisions," he says, and hopefully one day develop a clean source of energy by finding gold in our garbage.