RENEWABLE ENERGY

Turning wastewater into energy

FACT SHEET

BIOMASS

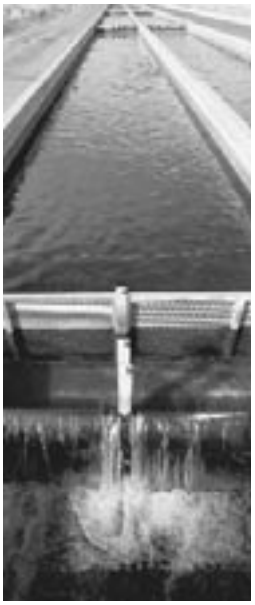
GEOTHERMAL

HYDROPOWER

SOLAR

WIND

Call Focus on Energy to learn about renewable energy options for your home, business or organization. The Renewable Energy Information Center can help with many renewable energy topics. Call 1.800.762.7077 or visit www.focusonenergy.com for additional information.



Wastewater treatment pond.

Both industrial facilities and municipal sewage treatment plants face the challenge of removing organic waste from water. They must not only meet minimum standards of water quality in their process, but also must deal with odor control and energy costs. These challenges will only increase as environmental regulations tighten and energy costs rise. Many industries and municipal wastewater treatment facilities are beginning to recognize anaerobic digestion to be a superior technology for meeting this challenge.

BENEFITS OF ANAEROBIC DIGESTION

- Because the process is contained, odor is controlled, which can help meet permitted limits on emissions.
- Anaerobic digestion destroys more volatile organic compounds and produces more gas than do traditional composting methods used for treatment of sludge.
- Anaerobic digestion produces less solid waste, and what is produced can be used directly on fields as a mulch or soil amendment.
- Biogas collected from the anaerobic digestion process can be used to offset energy costs by providing heat, running refrigeration, supplying process heating and producing electricity and steam.
- Using biogas reduces the need for fossil fuels and thus reduces the pollution that comes from drilling, mining, transportation and emissions, including carbon dioxide—a major contributor to global climate change.

FURTHER CONSIDERATIONS

Good design. The process of controlling anaerobic digestion and collecting the gas can be quite complex. Large operations and those in cold climates will require advanced engineering and technology. Choosing an experienced engineer to design the system is worth the investment. And once the system is built and operating, fine-tuning may be required for optimum performance.

ENERGY CENTER OF WISCONSIN

Madison Municipal Sewerage District treats 42 million gallons of water every day at the Nine Springs Wastewater Treatment Facility. The district has been using biogas to produce heat for over fifty years. In the early 1990s they installed two 475-kW generators for approximately $2 million. They save $370,000 per year in electricity and $75,000 in gas heating before operation and maintenance (O&M) expenses are deducted. Use of the energy is still profitable once O&M is considered. A system expansion is planned for the near future. The 600,000 cubic feet of gas produced per day is 60 percent methane.

Temperature. The anaerobic process works best at warmer temperatures. In systems where the waste is not warm, considerable heating may be necessary. The most efficient balance of energy use and energy production is part of a good design process.

focus on energy®
The power is within you.

What is anaerobic digestion?

Anaerobic digestion is the bacterial decomposition of organic matter that occurs in the absence of oxygen. Anaerobic bacteria exist naturally at the bottom of ponds, swamps and other moist and airless places, and even in the digestive tracts of termites and large animals. These bacteria are among the oldest life-forms on earth. Thousands of years ago, anaerobic decomposition of organic matter formed the earth's coal and oil deposits and created the natural gas we currently use for cooking and heating.

The same process can be duplicated today with a mechanical digester that re-creates the ideal natural conditions for decomposition. Three primary reasons for use of mechanical digesters in managing organic waste are nutrient recycling, waste treatment and odor control. The methane (also called biogas) produced in the process is a useful and valuable byproduct that can be used for heating and to generate electricity.

McCain Foods, Plover, Wisconsin. This food processing plant uses anaerobic digestion to treat 2.3 million gallons of wastewater daily as an alternative to traditional wastewater treatment. The process reduces total organic solids in the waste by up to 90 percent. The anaerobic system uses substantially less space than an equivalent traditional system. The first of two tanks was constructed in 1982 and the second in 1987. Total cost has been estimated to be about $3 million. The system produces 70 percent methane, which is used in combination with natural gas to run the boilers. Steam heat is used both for food processing and for heating the plant. Recent upgrades to the system have increased its efficiency, and currently half the waste stream is diverted to a biological nutrient removal process. In 2002, the anaerobic digestion system will save the company about $50,000 on fuel bills.

Corrosion. Sulphur dioxide and water vapor are trace gases sometimes present in biogas. These can combine to become sulphuric acid, which can corrode your equipment. Mitigating this problem can add to the system's expense.

Reliability. Depending on how the biogas will be used or distributed, back-up generation capability may be necessary.

Scale. The value of anaerobic digestion and biogas collection depends on economies of scale. Smaller operations may not be economically feasible.

FOR MORE INFORMATION

www.focusonenergy.com
Focus on Energy

Focus on Energy is a public-private partnership offering energy information and services to energy utility customers throughout Wisconsin. The goals of this program are to encourage energy efficiency and use of renewable energy, enhance the environment, and ensure the future supply of energy for Wisconsin. For information about the Focus on Energy services and programs, call 1.800.762.7077 or visit www.focusonenergy.com.

Publication REN2001-0602

focus on energy℠
The power is within you.