



Waste No Energy Digester System at a Glance

The WNE digester system:



Includes a 1.27 million-gallon digester



Treats a variety of wastes



Generates 1.43 MW of electricity



Produces organic fertilizers



Treats odor with bio-filters

ANAEROBIC DIGESTION TECHNOLOGY IN INDIANA

Waste No Energy Digester System

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Anaerobic digestion (AD) can treat a wide spectrum of organic wastes (including animal manure, farm residual wastes, food and food processing wastes, and oil and grease) and convert them to renewable energy and organic fertilizer.

The Waste No Energy (WNE) anaerobic digester system is owned and operated by the Waste No Energy, LLC, and is located east of Monticello in White County, Indiana. The WNE system is an example of one AD system that treats a variety of organic wastes. This publication describes some of the AD technology used in the WNE system.

The Anaerobic Digester System

In 2013, Waste No Energy established the anaerobic digestion system, which was designed by U.S. Biogas, LLC. The system has a complete-mix digester that is 95 feet in diameter, 26 feet tall, and has a total volume of 1.27 million gallons.

The digester has a double-membrane white roof to store biogas. Anaerobic digestion of organic wastes takes place in the digester at 102°F and has a hydraulic retention time of 35 to 40 days. The system also includes two inlet tanks, a bio-scrubber, a generator, and a lagoon tank (Table 1 and Figure 1). Its equivalent of 1.5 full-time employees operate the system, which runs 24 hours a day and 365 days a year.

Digester Feedstock

Every day, the WNE system treats five to six truckloads of co-digestion feedstock, approximately 26 tons of manure and 125 tons of organic food wastes (a total of 32,000 gallons per day). However, the WNE system does not accept hazardous wastes, human wastes, or animal remains.

The manure comes from 4,500 hogs and 300 beef cattle. The organic food wastes come from a variety of sources within a radius of about 150 miles. The organic food wastes include outdated grocery and bakery goods and food industry wastes (corn syrup, sugars, frosting, yogurt, milk, soda, energy drinks, beer/alcohol, fruit juice, ice cream, chocolate, and soups); restaurant wastes (fats, oils, and greases); cheese manufacturing wastes (cheese whey); brewery wastes (grain mash and liquor slurry); and biofuel production byproducts (ethanol syrup and glycerin bottoms). The average total solids of the feedstock are 10 to 12 percent.

Renewable Energy

The digester produces about 0.408 million cubic feet of biogas daily from the feedstock. A bio-scrubber removes hydrogen sulfide (H₂S) from the biogas to protect the equipment. The cleaned biogas is used in a 1.43-megawatt generator for combined heat and power (CHP) production.

The system produces 8.37 million kilowatt hours of electricity annually— enough to power 940 households. The owners sell the electricity to NIPSCO (Northern Indiana Public Service Company).

The system also produces 4.2 million BTUs (MMBtu) per hour (1,230 kilowatt hours) of thermal heat and recycles that heat back into the digester, inlet tanks, and process building to maintain their appropriate temperatures. The heat also produces hot water for employee use. The system has a backup boiler, which is fueled with LPG (liquid petroleum gas), to provide heat in event of a prolonged generator engine shutdown.

Impact on the Environment and Community

The WNE system converts the methane (CH₄) to carbon dioxide (CO₂) in the CHP. By doing so, the system reduces emissions by the equivalent of about 6,214 metric tons of carbon dioxide per year — that is roughly equal to 5,100 tons of coal burning per year. The owners convert this emission reduction to carbon credit and transfer it to NIPSCO.

The WNE system also produces 14 million gallons of liquid fertilizer per year. The liquid (under the name of Green Phoenix® Fertilizer) is sold to the public. Customers apply the fertilizer to croplands to improve soil fertility and reduce the use of inorganic fertilizers, which could harm the soil and ecosystems.

The WNE system provides other benefits to the environment and local communities, but not all of them can be quantified. Removing organic wastes from different locations to the WNE system greatly reduces air, water, and soil pollutions. The WNE facility redirects 54,750 tons of wastes per year away from landfills and helps the communities participate in an eco-friendly practice.

Economic Benefits

Among its several economic benefits, the WNE system:

- Provides revenue from selling electricity and carbon credits to NIPSCO
- Generates tipping fees from co-digestion feedstock providers
- Provides revenue from selling Green Phoenix® Fertilizer
- Saves money through the production tax credit (PTC) for biomass-to-energy conversion

Table 1. Some facts of the digester system.

Parameter	Fact
Initial operation year	2013
Digester volume	1.27 million gallons
Waste treatment	151 tons/day
Digestion temperature	102°F
Biogas production	~0.41 million cubic feet/day
Biogas treatment	Uses a sulfur bio-scrubber
Biogas utilization	Produces electricity, heat
Liquid fertilizer production	Produces 14 million gallons/year
Equivalent CO ₂ reduction	~6,214 metric tons/year

References

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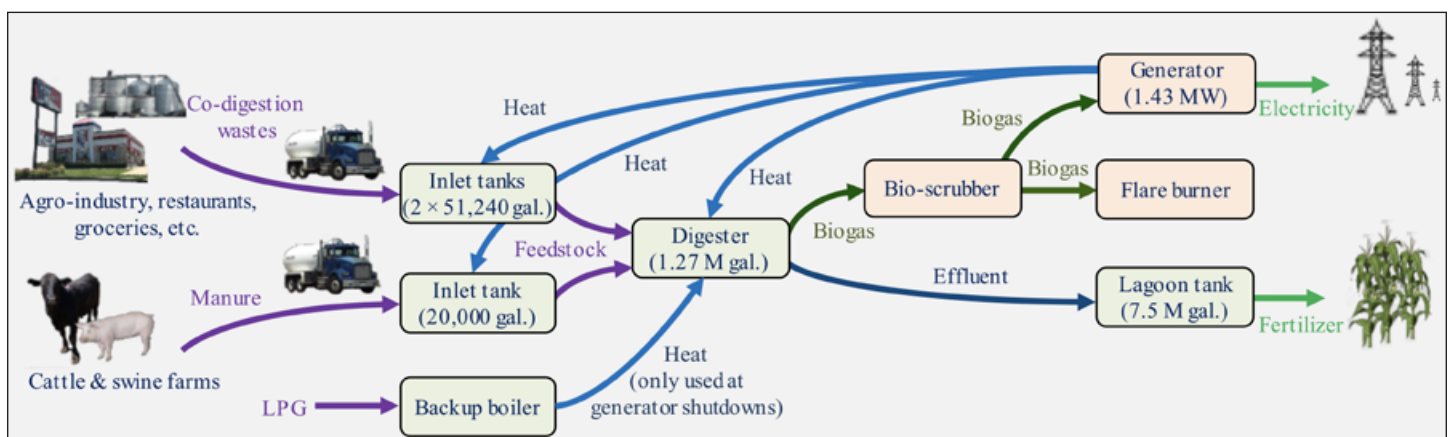


Figure 1. This illustration diagrams the process of the Waste No Energy anaerobic digester system.

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