FLATHEAD ELECTRIC LANDFILL GAS-TO-ENERGY PLANT

On June 26, 2009, Flathead Electric Cooperative began operation of the first landfill gas-to-energy plant in Montana. Landfill gas is produced by the natural degradation of municipal solid wastes by anaerobic (without oxygen) micro-organisms. Landfill gas is about 50% methane and 45% carbon dioxide with traces of other gases. Regulated control of methane emissions effectively requires the collection and combustion of landfill gases. A good use of these gases is to collect and produce electricity. There is little difference between an electric generating plant using landfill gas and one using natural gas or diesel fuel.

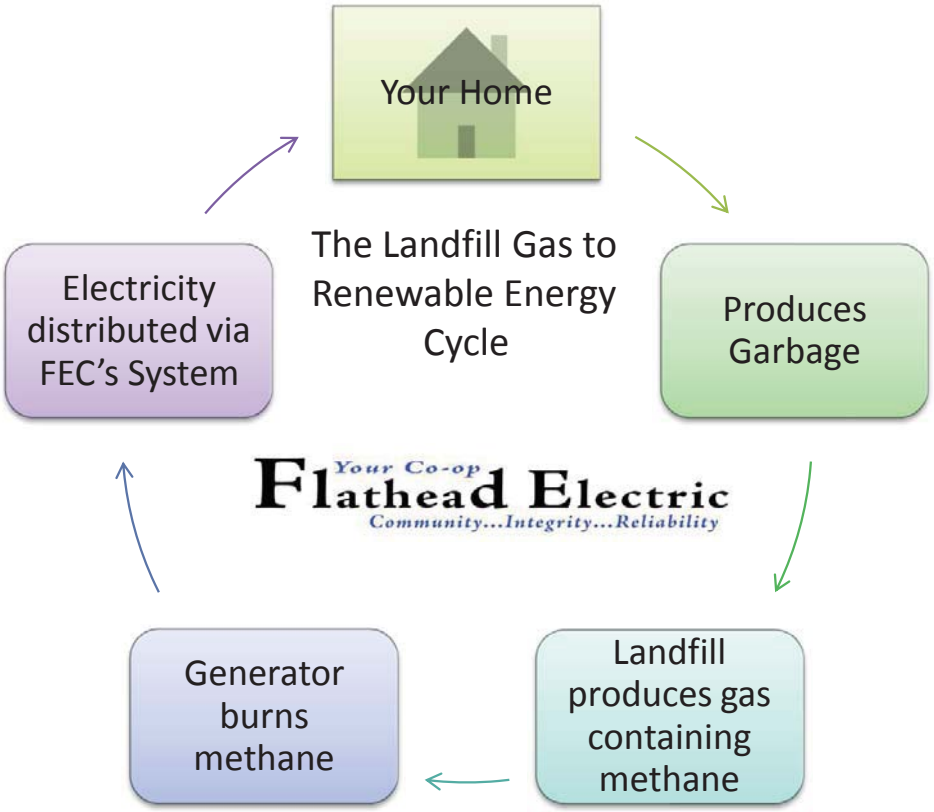
The plant has three basic components.

1. The **Gas Collection System** collects gas from decaying waste by a series of wells strategically placed throughout the landfill. Starting with 41 wells, the number of wells will vary throughout the years depending on volume, density and moisture content. Wells are constructed by drilling holes to within 15 feet of the bottom of the landfill. Perforated plastic pipe is inserted into each hole. The pipe is then surrounded by gravel to prevent refuse from plugging the perforations. The wells are connected by a series of pipes leading to a larger, header pipe that delivers the gas to the energy facility. The entire piping system is under a vacuum created by blowers at the energy facility, causing landfill gas to flow from the wells. The gas entering the collection system is saturated with water. The water and small particulate is removed by filters at the blowers and returned to the landfill.
2. The **Generating Facility** is a Caterpillar G3520C reciprocating engine/generator set that has been specifically configured to use landfill gas as fuel. The engine spins a generator that produces electricity. The gen-set has a rating of 1600 kilowatts and operates at 1200 RPM. The engine is equipped with electronic controls that allow for full engine control from a single source and can be computer monitored remotely. A 750 gallon virgin oil tank and a 500 gallon waste oil tank allow for automatic oil changes. Outside the building, an air-to-water radiator cools the engine and a silencer muffles the noise.
3. The **Grid Connection** is a dedicated power line used to deliver the electricity from the facility to Flathead Electric Cooperative's power distribution system. The grid connection includes metering equipment of plant output and system protection equipment with emergency shutdown capability.

The energy facility cost about $3.5 million to construct with an estimated 15-year payback. The facility was financed by CREB's (Clean Renewable Energy Bonds) awarded to Flathead Electric. Currently, the landfill produces about 370 cubic feet per minute (cfm) of recoverable landfill gas. This is enough fuel to generate power for about 900 households. The system has enough capacity to double power output as the well field matures and the landfill expands. Electricity from this plant is expected to cost between $0.055 and $0.063 per kilowatt hour.

Landfills are the largest source of human-based methane emissions in the U.S., constituting almost 40 % of these emissions each year. Combustion of landfill gas converts methane to carbon dioxide and water vapor. Methane has a global warming potential 23 times that of carbon dioxide by weight. Therefore, this conversion results in a significant positive benefit to the global atmosphere. Since the Flathead County Solid Waste Landfill is required to burn off the landfill gas anyway, the energy in the gas might as well go towards producing electricity.

Landfill Gas-to-Energy Facility



The process from curbside garbage to green energy is simple in concept. Your trash resides in the Flathead County Landfill. As the trash decomposes, it produces gas containing methane. This natural byproduct of garbage decomposition is the fuel used to generate renewable energy. A Landfill Gas-to-Energy facility harnesses the methane to power the generators.