GE
Energy

Don’t waste your waste. Turn it into energy.

Power generation from landfill gas
with Jenbacher gas engines.

ecomaginationSM
a GE commitment

GE imagination at work

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landfill gas as energy source

Landfill gas is created during the decomposition of organic substances and consists of methane (CH_4), carbon dioxide (CO_2) and nitrogen (N_2). Uncontrolled venting of landfill gas hampers or prevents rapid, scheduled recultivation of a landfill site. To prevent this and to avoid offensive smells, smouldering fires or the migration of gas, the gas must be continuously extracted under controlled conditions. With a calorific value of about 5 kWh/m^3_N, landfill gas constitutes a high-value fuel for gas engines that can be effectively used for power generation.

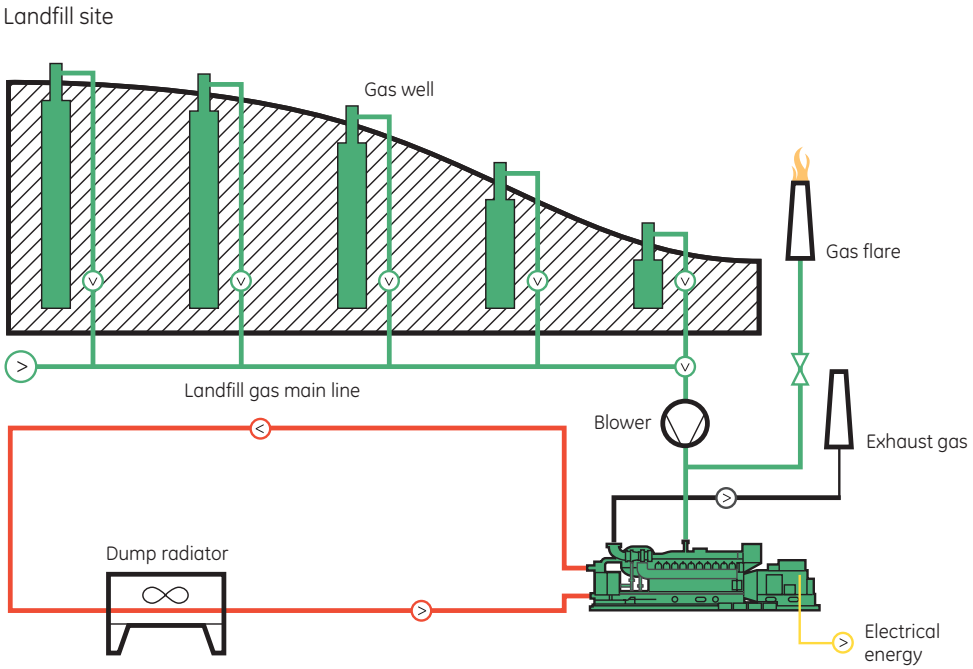
creation of landfill gas

Municipal waste contains about 150 to 250 kg of organic carbon per ton. These substances are biologically degradable and are converted by microorganisms into landfill gas in the absence of air. Stable, anaerobic methane fermentation begins one to two years after the waste is deposited in the landfill. If the landfill gas is collected constantly and in a controlled fashion, the following average values are achieved after the gas collection process has been properly adjusted:

Methane (CH_4) ..... approximately 40 – 50% by volume
Carbon dioxide (CO_2) ..... approximately 35 – 45% by volume
Nitrogen from air (N_2) ..... approximately 5 – 15% by volume
Oxygen from air (O_2) ..... approximately 1 – 3% by volume
Water vapour (H_2O) ..... saturated

the Jenbacher concept

Perforated tubes are drilled into the landfill body and interconnected by a pipe work system. Utilizing a blower, the gas is sucked from the landfill, compressed, dried and fed into the gas engine. For safety reasons, the installation of a gas flare is recommended so that excess gas can be burned off, if occuring. In most cases all the electrical power generated is fed into the public grid.



advantages

- Problem waste gas is converted to an energy source
- Methane (CH_4) releases into the atmosphere are reduced or eliminated. The climate relevant effect (Global Warming Potential, GWP) of methane is 21 times higher than that of CO_2
- Landfill gas presents an alternative to conventional fuels
- Highly efficient for power generation with gas engines

volume and production process figures

Gas formation is influenced by a number of factors such as the landfill material, the storage height and density, water content, air temperature, atmospheric pressure and precipitation levels. The decomposition process in a landfill providing gas with sufficient methane content lasts about 15 to 25 years, with the gas volume decreasing continuously over the years.

One ton of municipal waste produces about 150 to 250 m^3_N of landfill gas with a methane content of about 40 to 50% in a time period of 15 to 25 years. An average municipal waste landfill with an utilized storage capacity of 1,000,000 tons can be expected to generate about 10 million m^3_N of landfill gas per year, corresponding roughly to an usable content of 22.5 GW-hours. From this volume of gas, about 8 GW-hours of electricity can be generated per year – that corresponds roughly to the demand of 2,600 EU households. In addition, this gas amount allows operating a 1 MW gas engine for power generation.

our competence

We have the ideal solution for efficiently utilizing landfill gas. With more than 25 years of experience in the combustion of landfill gas and currently more than 1,100 landfill gas systems with a total electrical output of over 1,050 MW delivered throughout the world, the Jenbacher product team offers an unparalleled breadth of expertise, references and solution variants.

These plants generate about 8.3 million MW-hours of electricity a year – enough to supply about 2 million EU homes. In addition, by capturing landfill gas instead of emitting it directly into the atmosphere and using it for power generation in place of fossil fuels, these engines can reduce greenhouse gas emissions of 35 million metric tons each year. This amount of greenhouse gas emission savings equals to the annual emissions related to 20 million EU passenger cars or burning over 3 million tons of coal.

Jenbacher landfill gas engines have been certified as „ecomagination" products by an independent agency as they provide our customers with a cost-effective, high output means of generating power while substantially and measurably reducing emissions from their operations. Ecomagination is a GE commitment (www.ge.com/ecomagination) to use and develop new technologies to help customers around the world meet escalating environmental challenges.

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GE's Jenbacher gas engine division is one of the world's leading manufacturers of gas-fueled reciprocating engines, packaged generator sets and cogeneration units for power generation. It is one of the only companies in the world focusing exclusively on gas engine technology.

GE's Jenbacher gas engines range in power from 0.25 to 3 MW and run on either natural gas or a variety of other gases (e.g., biogas, landfill gas, coal mine gas, sewage gas, combustible industrial waste gases).

A broad range of commercial, industrial, and municipal customers use Jenbacher products for on-site generation of power, heat, and cooling. Patented combustion systems, engine controls, and monitoring enable its power generation plants to meet stringent emission standards, while offering high levels of efficiency, durability, and reliability.

GE's Jenbacher product team has its headquarters, production facilities, and 1,200 of its more than 1,400 worldwide employees in Jenbach, Austria.

GEA-13720A

for more information on Jenbacher gas engines

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GE imagination at work