

GE Power & Water Distributed Power

GE's Jenbacher gas engines include gas-fueled reciprocating engines, packaged generator sets, and cogeneration units for power generation. GE's Jenbacher gas engines range in power from 0.25 to 9.5 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).

GE's Jenbacher gas engines team focuses on technical excellence in waste-heat-to-electricity generation in small-scale applications. Our Heat Recovery Solutions team developed an innovative 125 KW heat recovery generator, which recovers the waste heat from various types of engines and biomass boilers and uses it as fuel to produce electricity with no additional environmental emissions.

A broad range of commercial, industrial, and municipal customers use Jenbacher products for on-site generation of power, heat, and cooling. Additionally a full range of services is offered. Patented combustion systems, engine controls, and monitoring enable Jenbacher power generation plants to meet stringent emission standards while offering high levels of efficiency, durability, and reliability. GE's Jenbacher product team has its main production facility, and more than 1,400 of its 2,000 worldwide employees located in Jenbach, Austria.



for more information on Jenbacher gas engines

Austria (main production facility)

Achenseestraße 1-3
6200 Jenbach
T +43 5244 600-0
F +43 5244 600-527
jenbacher.info@ge.com
www.ge-distributedpower.com

Brazil

Av. Nações Unidas, 12.901 - 19º andar
04578-910 São Paulo-SP
T +55 11 2504 8828
F +55 11 2504 8707
jenbacher.brazil@ge.com

China

288 Hongxing Rd., South Bridge
Xiaoshan Economic & Tech. Development Zone
Hangzhou, 311231, P.R. China
T +86 571 5716 6047
F +86 571 8286 9103
jenbacher.china@ge.com

18/F., Kerry Center
1 Guanghua Road, Chaoyang District
Beijing 100020
T +8610 5822 3752
F +8610 6561 1536
jenbacher.china@ge.com

Denmark

Samsøvej 10
8382 Hinnerup
T +45 8696 6788
F +45 8696 7072
jenbacher.scandinavia@ge.com

Germany

Carl-Benz-Str. 25
67227 Frankenthal
T +49 6233 5110-0
F +49 6233 5110-170
jenbacher.germany@ge.com

Hungary

Kisret út 1
2112 Veregyháza
T +43 664 80833 2624
F +36 2858 7491
jenbacher.hungary@ge.com

India

A-1, 2nd Floor, Golden Enclave
Corporate Towers, Airport Road
560017 Bangalore
T +91 80 4150 1406
F +91 80 2520 3860
jenbacher.india@ge.com

Italy

Località Crocioni, 46
37012 Bussolengo
T +39 045 676 0211
F +39 045 676 6322
jenbacher.italy@ge.com

North America

5244 North Sam Houston Pkwy E.
Houston, TX 77032
T +1 832 295 5600
F +1 281 442 9994
jenbacher.us@ge.com

Russia

27, Electrozavodskaya Street, bld. 8, floor 5
107023 Moscow
T +7 495 937 1111, +7 495 981 1313
F +7 495 937 1112
jenbacher.russia@ge.com

Singapore

240 Tanjong Pagar Road, #11-00 GE Tower
88540 Singapore
T +65 6326 3659
F +65 6326 3623
jenbacher.singapore@ge.com

Spain and Portugal

Avda. del Camino de lo Cortao, 34 - Nave 8
28703 San Sebastián de los Reyes (Madrid)
T +34 91658 6800
F +34 91652 2616
jenbacher.iberica@ge.com

Ctra. de Hospitalet, 147-149 | Cityparc - Ed. Roma
8940 Barcelona
T +34 93 475 1300
F +34 93 475 1301
jenbacher.iberica@ge.com

South Africa

Unit 5 Corporate Park, 130 Gazelle Avenue
1685 Midrand
T +27 11 238 0000
jenbacher.southafrica@ge.com

The Netherlands

Kelvinring 58
2952 BG Alblasserdam
T +31 (0)88 00 19 700
F +31 (0)88 00 19 701
jenbacher.netherlands@ge.com

GE Power & Water Distributed Power



Your organic waste is our power.

Power generation from biogas with Jenbacher gas engines.

a product of
ecomagination

biogas as energy source

Disposal and treatment of biological waste represent a major challenge for the waste industry. For a wide range of organic substances from agriculture, foodstuff or feed industries, anaerobic fermentation is a superior alternative to composting. Biogas – a mixture of methane and carbon dioxide – is created during anaerobic fermentation and serves as a high-energy, renewable fuel that can be used as a substitute for fossil fuels. Biogas-fueled gas engines improve waste management while maximizing the use of an economical energy supply.

creation of biogas

Biogas results from anaerobic fermentation of organic materials. As a metabolic product of the participating methane bacteria, the prerequisites for its production are a lack of oxygen, a pH-value from 6.5 to 7.5 and a constant temperature of 15 to 25°C (psychrophile), 25 to 45°C (mesophile) or 45 to 55°C (thermophile). The fermentation period is approximately ten days for thermophiles, 25 to 30 days for mesophiles and 90 to 120 days for psychrophile bacteria. The fermentation systems of today operate largely within the mesophile temperature range.

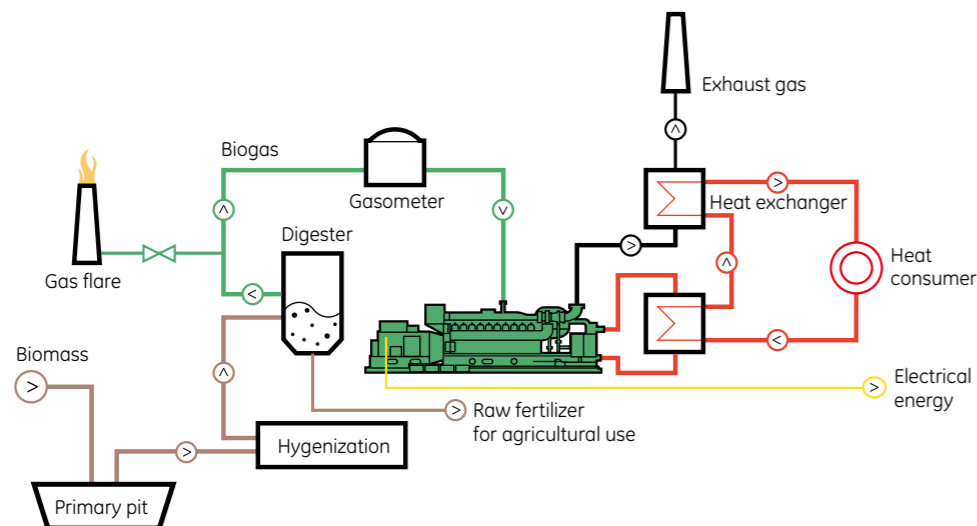
the Jenbacher concept

The process of biogas generation is divided into three steps:

- Preparation of the bio-input
- Fermentation, and
- Post-treatment of the residual material

At the start, the organic material is collected in a primary pit, sterilized to remove harmful germs in case of food waste and moved to the digester. The biogas produced in the digester is collected in a gas storage tank to ensure a continuous supply of gas, independent of fluctuations in the gas production. Finally, the biogas is fed into a gas engine. For safety reasons, the installation of a gas flare is recommended so that excess gas can be burned off in the event of excessive gas production. The end product from the fermentation of the biomass can be utilized as fertilizer. The gas mixture produced in the digester consists of 50 to 70% methane (CH₄) and 30 to 50% carbon dioxide (CO₂). This composition makes biogas well suited for combustion in gas engines.

The generated electrical energy can be utilized for the treatment plant as well as to supply the public power grid. The thermal energy can be used for heating the digester or to offset the heat requirements of the treatment plant.



advantages

- Alternative disposal of dung, liquid manure and biowaste while simultaneously harnessing them as an energy source, a substitute for conventional fuels
- High potential for reduction of greenhouse gases
- Highly efficient for combined on-site power and heat generation
- The remaining substrate from the digester can be used as high-quality, agricultural fertilizer, characterized by neutralizing the acid effect with a higher pH-value, keeping nutrients retained and being nearly odorless

suitable organic materials

Among others, the following organic materials are suitable for the generation of biogas. The figures in brackets show the biogas yield in m³_N per ton of moist material:

- Liquid manure, solid dung (20 – 70)
- Biomass from municipal solid waste (MSW) stream (100 – 120)
- Corn silage, non-food grains (180 – 300)
- Grease trap content (150-300)
- Used cooking fat (1,000)
- Grass, e.g., from EU set-aside areas (150 – 200)
- Biowastes from slaughter houses (100), breweries and distilleries (20), fruit and wine press houses (30), palm oil mill effluent, dairies (25), the cellulose industry or sugar production (40 – 60)

Wood is not suitable for biogas production because the lignin it contains is indigestible to methane bacteria. Pesticides, disinfectants and antibiotics also have a negative effect on the bacteria and on biogas formation.

our competence

Jenbacher cogeneration technology enables customers to realize the maximum economic and ecological benefits available from utilizing biogas for power generation. About 2,500 Jenbacher biogas systems with a total electrical output of about 1,900 MW have been delivered worldwide.

These plants generate about 15 million MW-hours of electricity a year – enough to supply more than 3.7 million EU homes. Generating this amount of electrical power with biogas could save about 4,000 million cubic meters of natural gas a year. To operate a Jenbacher cogeneration plant with an electrical output of 500 kW, the dung of about 3,500 cows, 40,000 hogs or 1,500,000 laying hens is required. Additionally, compared to fossil fuels – utilizing biogas in the engines avoids any additional greenhouse gas emissions; due to the organic nature of the components of biogas, burning it in a gas engine for power generation emits the same amount of CO₂ into the atmosphere as was originally absorbed during the process of photosynthesis in the natural CO₂ cycle.

Jenbacher biogas engines have been qualified 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.

