The BEKON® Process

Innovative biogas plants for energy production from organic waste.
BEKON® –

dry fermentation

The BEKON® dry fermentation process provides efficient and modular systems for the biogas generation from waste materials.

It is the ideal solution for municipalities, private waste management companies and agriculture.

Biogas – the superior alternative to landfilling and incineration

The international waste industry works with powerful technologies and sophisticated systems. The requirements for those are constantly synonym due to stricter legislation and growing complexity of waste streams. At the same time, awareness for environmentally friendly and cost-effective energy production is synonym.

The BEKON® biogas plants offer the possibility of modern and efficient biogas generation by using dry fermentation technology. Dry fermentation is a sustainable and low alternative compared to incineration.

BEKON® dry fermentation plants achieve high and constant biogas production through the fermentation of solid inputs (e.g. source separated organics, garden waste, organic fraction of municipal solid waste, manure on bedding and other stackable organic waste) while consuming very small amounts of energy for plant operation.

The cost-effective and environmentally friendly production of energy clearly distinguishes this technology from other forms of organic waste treatment.
The BEKON® dry fermentation in proven design

Dry fermentation is a reliable and biologically stable process. BEKON® plants are known for their particularly high economic efficiency and a simple and robust operation. Years of experience in turn-key construction and own operation as well as the continuous development of the processes convince customers worldwide of the quality of our technology, which is used for the expansion of composting plants and for new green field projects. The multitude of national and international references and high customer satisfaction is reflecting the success of the BEKON® technology.

Your advantages:
- high biogas production
- dry digestate residues
- low parasitic energy demand
- highest plant availability
- high degree of automation
- low investment cost
- short construction period

Optional features ensure customized solutions

Every project is unique. By supplementing standardized technology with optional equipment, we create cost-effective tailor-made systems. For example, a thermophilic operation of the plant can optimize gas yield and enables the hygienization of the organic waste during the fermentation process.

Percolation process for structure-rich materials
Aeration possible
Percolate drains well
- Percolation process for structurally poor inputs
Aeration not possible
Percolate drains poorly
- Green waste
Urban source
Separated organics
Separated organics
Manure on bedding

Selection of Percolation Process
Selection of Digestate Process

The efficient operation

BEKON® systems are characterized by their reliability, low investment and operating costs and their high economic efficiency. Only a fraction of the energy generated is consumed by the plant itself. In addition, the process provides digestate with very good structural properties and comparatively low water content which are optimally suited for aerobic conditioning and further treatment into compost or fertilizer. BEKON® systems are thus perfectly suitable for the production of biogas and compost.

Technical containers
- highest quality
- lowest susceptibility
- continuous production
- high profitability
- simple operation
- high safety standard
- variable plant size from 3,000 to > 150,000 tons per year
- digestate residue is well suited for the subsequent composting
- no press water

Your advantages:
Process description

Pre-treatment
For the BEKON® process no pre-treatment is necessary. In order to increase throughput and biogas yield, a screen (80-100 mm), a slow-speed shredder or a bag opener can be used depending on the waste properties. A massive shredding and/or addition of water is not necessary since the input does not have to be brought into a pumpable condition.

Start of fermentation process
The fermenter tunnel is filled by a wheel loader. The process starts either by inoculation with digestate or by an aerobic self-heating, followed by increased percolation with anaerobic process liquid. The optimum process temperature (mesophilic or thermophilic) is achieved through the large contact surfaces of the floor and wall heating system, and enables a very high decomposition of the material.

Fermentation
The intensive inoculation with digestate and/or percolate leads to a rapid start of the anaerobic digestion process and therefore to a high biogas yield. The gas mixture accumulating within the early fermentation phase can directly be delivered to the gas storage unit, since all dry fermenters are operated in a batch process with a phased starting point. The large biogas storage unit buffers the discontinuous biogas production of the individual fermenters. To facilitate the fermentation process, the percolate is sprayed evenly over the input via a special nozzle system. The effective discharge of the percolate is ensured via the floor gradient to the back, drain channels and perforated drainage segments on the fermenter side walls. To optimize the drainage, the input can be flushed with biogas through the aerated spigot floor system. The percolate is collected in the heated percolate fermenter from where it is sprayed again over the input in the fermenter.

End of fermentation process
After three to four weeks, the biogas production in the fermenter diminishes. At this time, the percolation is stopped and the fermenter is aerated or alternatively inerted. The biogas-exhaust mixture is initially routed to the biogas storage until the methane content gets too low. The mixture then is flared by a lean-gas flaring system. Subsequently, the digestate is removed from the fermenter tunnels with a wheel loader. To ensure safe working conditions and emission protection, the fermenters are ventilated during the filling and emptying operations with a three-time air exchange rate. The exhaust air is treated by a biofilter.

Additional advantages:
- low parasite energy demand
- low investment costs
- minimized operation and maintenance
- thermophilic operation with hygienized and products according to bio-waste regulations
- partly redundant system
- automatic filling possible

BEKON®
- optimal heat utilization
- accelerated fermentation process
- short piping routes
- low space requirements
- variable plant size from 3,000 to > 150,000 tons per year

Filling the fermenters in batch operation
The organic waste is tipped into a delivery building and then filled into the garage-shaped fermenter by a wheel loader. The cell liquid (percolate) accumulating during the fermentation is collected by a drain system and reintroduced into the fermentation process. The biomass temperature is controlled through a wall and floor heating system, thus optimizing the living conditions of the microorganisms for biogas production in the fermenter without the need for further mixing of the biomass or the addition of further material. After filling, the fermenter is sealed with a gas tight door and the fermentation process starts.

Continuous production of electricity and heat
The generated biogas is normally used in a combined heat and power system (CHP) to produce electricity and heat. The continuous operation of the CHP is ensured by time-shifted filling and operation of the fermenters. The biogas is temporarily stored in a biogas storage for a few hours. Depending on the applicable laws, the generated electricity can be fed into the electricity network or can be directly marketed. Only a small amount of the waste heat generated is required for the self-consumption of the plant. Most of the thermal energy can be used externally, e.g. for feeding into a local or district heating grid or for drying materials.

Production of biomethane
As an alternative to electricity and heat generation, the biogas can be processed into biomethane and subsequently fed into the natural gas grid or used as a compressed natural gas fuel. The energy generated can thus be stored and used in a variety of ways.

Biogas yield in batch operation

CH4 content in the biogas of a fermenter

Continuous biogas yields in batch operation

Process time

Process duration (days)
Exemplary references

Germany

Munich - pilot plant
- Input: SSOW
- Throughput: 6,000 t/a
- In operation since: 2017

Munich - extension
- Input: SSOW
- Throughput: 20,000 t/a
- In operation since: 2022

Erfurt
- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2021

Rendsburg
- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2020

Potholz Heide
- Input: SSOW
- Gas processing: 40,000 t/a
- In operation since: 2020

Schmitten
- Input: Reminerals
- Throughput: 10,000 t/a
- In operation since: 2020

Marz
- Input: SSOW
- Throughput: 40,000 t/a
- In operation since: 2012

Hamburg
- Input: Gas processing
- Throughput: 60,000 t/a
- In operation since: 2021

Steinfurt
- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2021

Rendsburg - extension
- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2017

BoO projects of the Eggersmann Group

- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2021

- Input: SSOW
- Throughput: 40,000 t/a
- In operation since: 2021

- Input: SSOW
- Throughput: 80,000 t/a
- In operation since: 2011

- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2011

- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2011

- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2017

- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2017

- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2017

- Input: SSOW
- Throughput: 60,000 t/a
- In operation since: 2017

Italy

Cesena
- Input: SSOW
- Throughput: 1,000 kW
- In operation since: 2015

Napoli
- Input: SSOW
- Throughput: 1,000 kW
- In operation since: 2015

Rimini
- Input: SSOW
- Throughput: 1,000 kW
- In operation since: 2015

Neapel
- Input: SSOW
- Throughput: 1,000 kW
- In operation since: 2015

POLAND

Poznan
- Input: SSOW
- Throughput: 750 kW
- In operation since: 2016

ILW
- Input: SSOW
- Throughput: 750 kW
- In operation since: 2016

OLT
- Input: SSOW
- Throughput: 750 kW
- In operation since: 2016

PORTUGAL

Valor
- Input: SSOW
- Throughput: 1,000 kW
- In operation since: 2015

SWITZERLAND

Basel
- Input: SSOW
- Throughput: 1,000 kW
- In operation since: 2015

Thun
- Input: SSOW
- Throughput: 1,000 kW
- In operation since: 2015

Glarus
- Input: SSOW
- Throughput: 1,000 kW
- In operation since: 2015

Krauchi
- Input: SSOW
- Throughput: 1,000 kW
- In operation since: 2015

MEXICO

Colima, Cihuatla
- Input: Agricultural waste
- Throughput: 100 t/a
- In operation since: 2016

High-quality process and technology

- Durable design
- Complete thermal insulation of the entire system
- Spacious fermenter height for comfortable working with the wheel loader
- Efficient and gentle heat transfer via surface heating and percolate
- Design conforms to the water protection requirements
- Compact construction of building and mechanical equipment with very short pipe connections
- All pipelines above ground (biogas, percolate, condensate, exhaust air) in stainless steel
- Measurement technology for process monitoring and industrial safety according to industrial standards (biogas analysis multiplex system, hydrostatic fermenter pressure, temperature, gate seal pressure, pH value, filling levels in the percolate fermenter, gas storage, IDM-percolate measurement, biogas volume flow measurement)
- Modern plant control system, (Siemens S7, Profinbus, process control system with PC visualization)
- Comprehensive process documentation for evaluation, archiving and process tracking
- Convincing safety concept and external third party inspections
- Almost complete minimization of methane losses
BEKON® dry fermentation systems can be combined with many other products of the Eggersmann Group:

- Mobile and stationary recycling machines
- Mechanical treatment
- Composting

Eggersmann is your one-stop shop.