



## BIOGAS PLANTS





## Leader in renewable energy resources in Slovakia

In constantly changing market in the area of renewable resources, IMAO electric, s.r.o. is the leading supplier of complete solutions for PV plants and biogas stations in Slovakia. Our services does not include only design, but as well project documentation and project installation as well. As well, we offer to customer technical suport and maintenance during the operation of the mentioned project.

IMAO electric, s.r.o. was founded in 2008 as a wholesaler and retailer of complete electro installation material and lightings. In 2009 it has established on the market of renewable energies together with its daughters company Osmont electroinstallations, s.r.o., mainly by installing of solar plants and roof systems. In 2012 IMAO became the general supplier of installations 10MW of biogas stations in Slovak republic.



## We strive to excel in everything we do.

If you want to produce biogas successfully and profitably, you need an experienced partner that is able to react quickly and correctly. We do think that biogas power plants should be planned, constructed and supported by a single source. This is why we offer a complete service package to our customers to ensure the successful operation of the biogas power plant and to protect your investment at the same time.



# Project development

## Profitability analysis

- Plant rating (tank size, input system, plant output)
- Financial aspects
- Profitability analysis (liquidity/profitability)

## Technical analysis

- Site planning with a view to possible expansion
- Support with planning permission
- Support with planning aspects of gas and electricity feed-in

# Project implementation

## Construction phase

- Construction and installation Initial commissioning

## Initial check

- Technical and biological commissioning of the plant
- Operator training

# Aftersales service

## Biological process support

- Provision of maintenance work
- Remote monitoring
- Process Evaluation

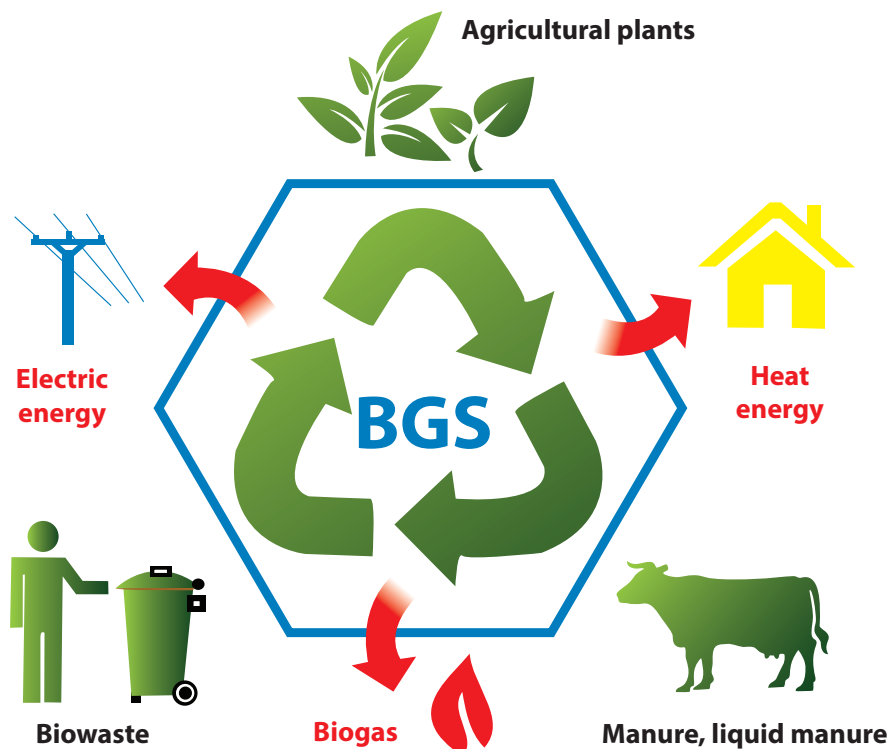


# How is biogas made?

Biogas is a mixture of carbon dioxide and methane. It is formed when bacteria break down organic material in the absence of oxygen, also called anaerobic digestion, for example in the digestive system of cattle. The possible uses of biogas are diverse. Cogeneration unit converts energetically rich biogas to electric current and heat. While the produced electric power is fed into the public network, the produced heat can be used for example for the heating of stables, residential buildings or industrial companies.

An interesting alternative for biogas production is the conditioning of raw materials to natural gas quality and then feeding it into the public gas grid. With this method, the gas can be transported over long distances and used as needed. Suitable starting substrates for biogas production are among other things renewable resources like maize, grass or rye. Also other plants such as sunflowers or sugar beets can be used. Biogas can also be gained from solid and liquid manure. Even organic waste, for which there is otherwise no use, may be utilised.

After the complete degradation a liquid, largely odour-neutral residue remains. This digestate is applied as a high-quality organic fertilizer for the fields. The nutrient cycle is completed.



## Type of biogas power plants

### Biogas plants based on agricultural resources

If the input material mainly consists of plant materials such as maize silage, biogas plants generally operate with a continuously operating two-stage process. These consist of digester, secondary digester and a residue storage tank. This ensures a high biological stability of the installation. For the bacteria the same environmental conditions are prevalent in the secondary digester as in the digester. Thus we can ensure a maximum yield of gas of the slower degradable input materials, because in this second stage up to 20% of the potential gas yield is obtained.

Many operators of biogas plants use manure or dung in addition. It was developed a single-stage biogas plant which is specially adapted to the use of manure. This concept consists only of a digester and residue storage tank.

Since manure digests more quickly than silage, the one-stage design without the secondary digester is an economically much more attractive concept. Due to the high proportion of manure, the substrate from the digester has only a very low residual gas potential, which does not justify the investment in the construction of a secondary fermenter.





## Biogas plants based on organic waste

Organic waste material is also suitable as a starting substrate. In particular, waste from food production and processing, such as organic waste, fats, slaughterhouse waste, but also waste from the production of alcoholic beverages (including pulp and grains) can be used in a biogas plant. Out of the waste a high-quality raw material is made that can be used practically for energy production.

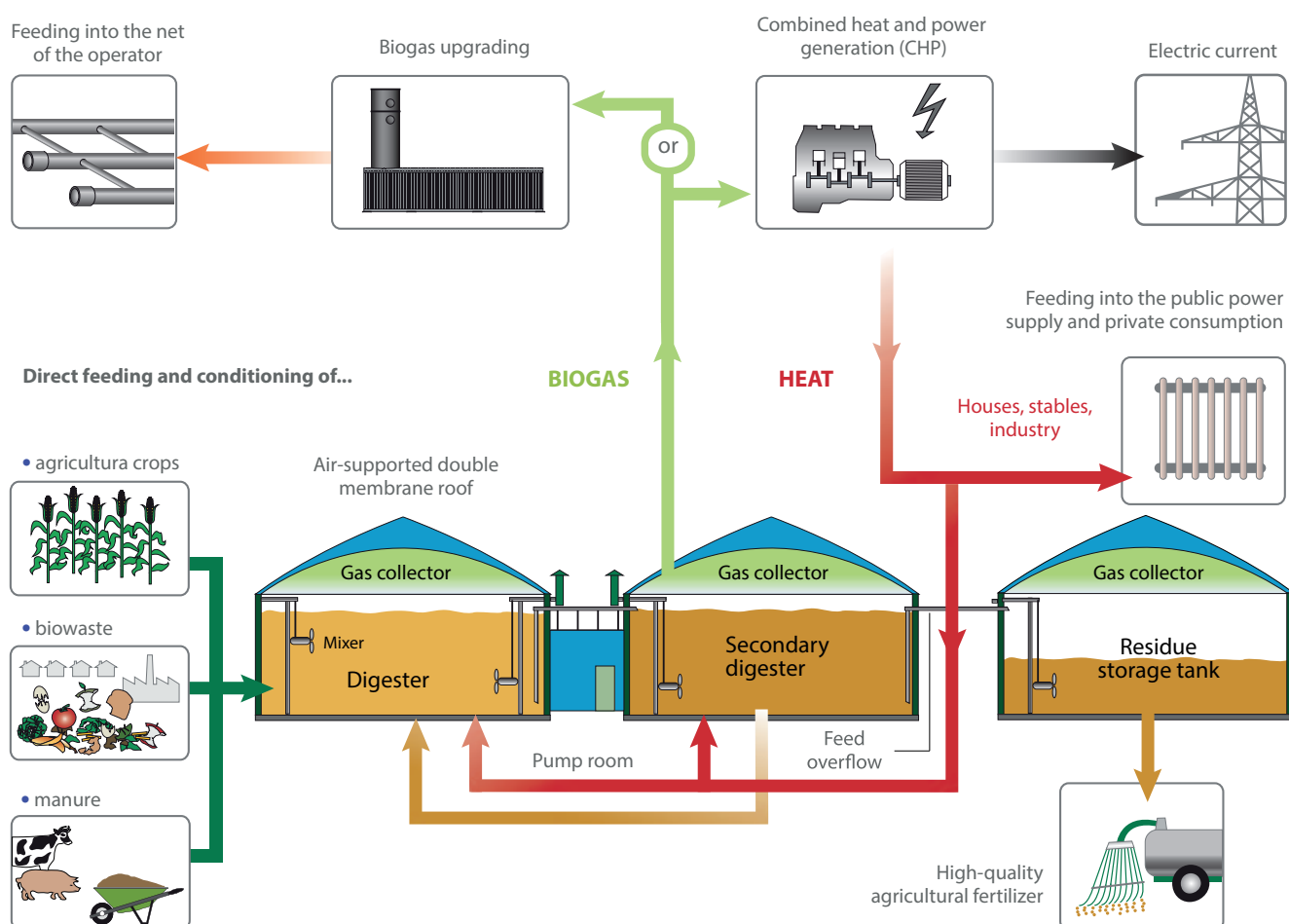
This has many ecological and economic benefits. Plants based on waste must be planned in accordance with statutory requirements and the respective substrate characteristics and volumes. This applies in particular to reception, storage, shredding and sanitation. From plants which use organic waste a residue with a high fertilizer value remains.







## General flow chart of a two-stage biogas plant



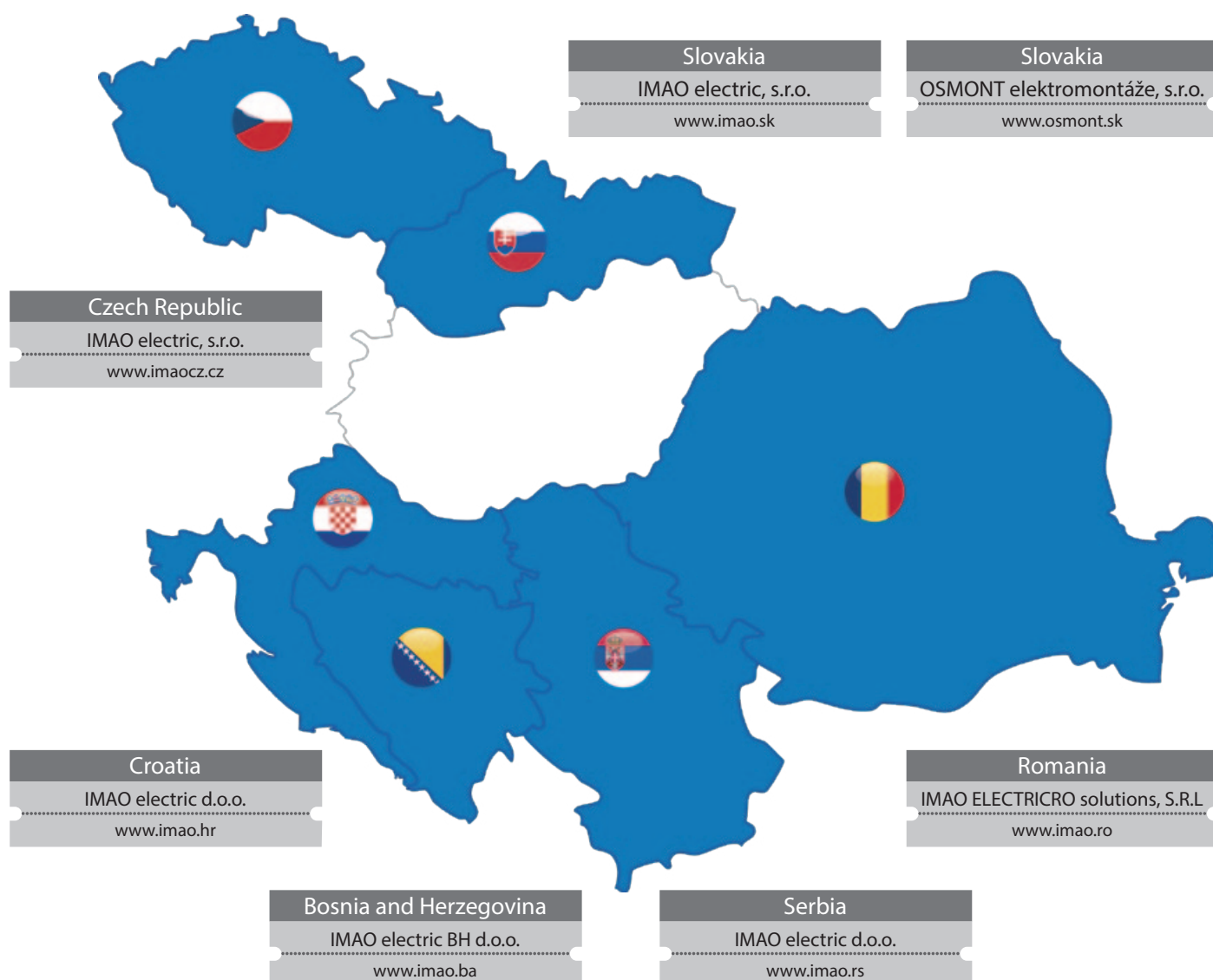
## List of projects - Biogas plants

Name	Power	Inversor	Year of construction	Participation
BGS Hubice	700 kW	BPS Hubice s.r.o.	2012	General contractor
BGS Mostova	500 kW	Ing. Peter Horvath	2012	General contractor
BGS Sládkovičovo	999 kW	BPS Sládkovičovo s.r.o.	2012	General contractor
BGS Šintava	999 kW	BPS Šintava s.r.o.	2012	General contractor
BGS Vesele	999 kW	BPS Veselé s.r.o.	2012	General contractor
BGS Senec	999 kW	BPS Senec s.r.o.	2012	General contractor
BGS Prašník	999 kW	BioREn s.r.o.	2012	General contractor
BGS Myjava	999 kW	BPS Myjava s.r.o.	2012	General contractor
BGS Medzibrod	999 kW	BioREn BB s.r.o.	2012	General contractor
BGS Gabčíkovo	999 kW	Elbiogas s.r.o.	2012	General contractor
BGS Sládkovičov III.	999 kW	BPS Juh s.r.o.	2012	General contractor
BGS Želovce - Selu	999 kW	BPS Selu s.r.o.	2013	Supplier of HV and LV components
BGS Želovce – Juriky	999 kW	BPS Juriky s.r.o.	2013	Supplier of HV and LV components
BGS Tvrdošín	800 kW	VSV Group s.r.o.	2013	General contractor
BGS Horný Jatov	500 kW	BPS Horný Jatov s.r.o.	2013	General contractor
BGS Čabradský Vrbovok	800 kW	BPC s.r.o.	2014	General contractor
BGS Malcov	800 kW	BIO INVESTMENTS s.r.o.	2014	Supplier of HV and LV components
BGS Majcichov	999 kW	BPS Vlčkovce s.r.o.	2014	General contractor

HV – high voltage LV – low voltage

BGS – Biogas plant





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