



Biogal - The green biogas plant in Boleszyn

Biogal is an ecological biogas plant located in Boleszyn – a village in Warmińsko-Mazurskie Voivodeship, Poland. It was founded in 2012 and currently employs over 40 people. The company obtains raw materials such as manure and self-grown corn from its own pig farm and from other local farmers to produce biogas. In addition, Biogal also processes agrifood industry waste products such as residues from brewing, fruits and vegetables production and overdue food.

Biogal’s activity is beneficial especially for the pig producers who do not have enough agricultural area to meet the Nitrates Directive, i.e. due to cooperation with Biogal they are able to deal with production of manure and slurry exceeding 170 kg per 1 ha per year. Biogal deals with energy production from a combination of renewable sources, waste food products processing, organic fertilizer production (productized under the Naturgal brand) as well as obtaining wind and solar energy. The company is currently implementing several wind energy investments in local villages and towns in Warmia and Mazury.

The ecological granulated digestate fertilizer Naturgal is produced in the mesophilic natural manure methane fermentation process, and it is recommended for vegetable crops, ornamental plants, fruit trees, shrubs as well as field crops. This fertilizer enhances the natural development and high quality of crops. Obtained electricity and heat constitute an effective element of infrastructure development, allowing electricity supply for Biogal’s own needs, for other local farmers, residents and for public sector institutions. Heat is provided for 2 local factories, 3 schools, 2 churches and 350 single-family houses – the company supplies energy to 4 nearby villages and built a 27 km long heat pipeline in the area surrounding the plant in Boleszyn. The constructed heating network is routed to a construction and housing elements manufacturing plant and serves for precast concrete products drying.



Source: Biogal

KEY WORDS

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AUTHORS

Andrzej Galiński & Piotr Kaleta

(BIOGAL Sp. z o.o.)

Agnieszka Pyzel & Anna Subocz

(WMODR)

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Facts of the Biogas plant:

- Electricity generating installation's value is 11.5 million euro (52 million PLN)
- Total installation's value, including heat, energy transmission and fertilizer production is 15 million euro (70 million PLN)
- Direct operating costs per MW of generated electricity is 70 euro (320 PLN)
- Indirect operating costs per MW of generated electricity is 26 euro (120 PLN)
- Installed electricity capacity is 3.6 MW
- Technology readiness level (TRL) is 9 which means it is a ready solution

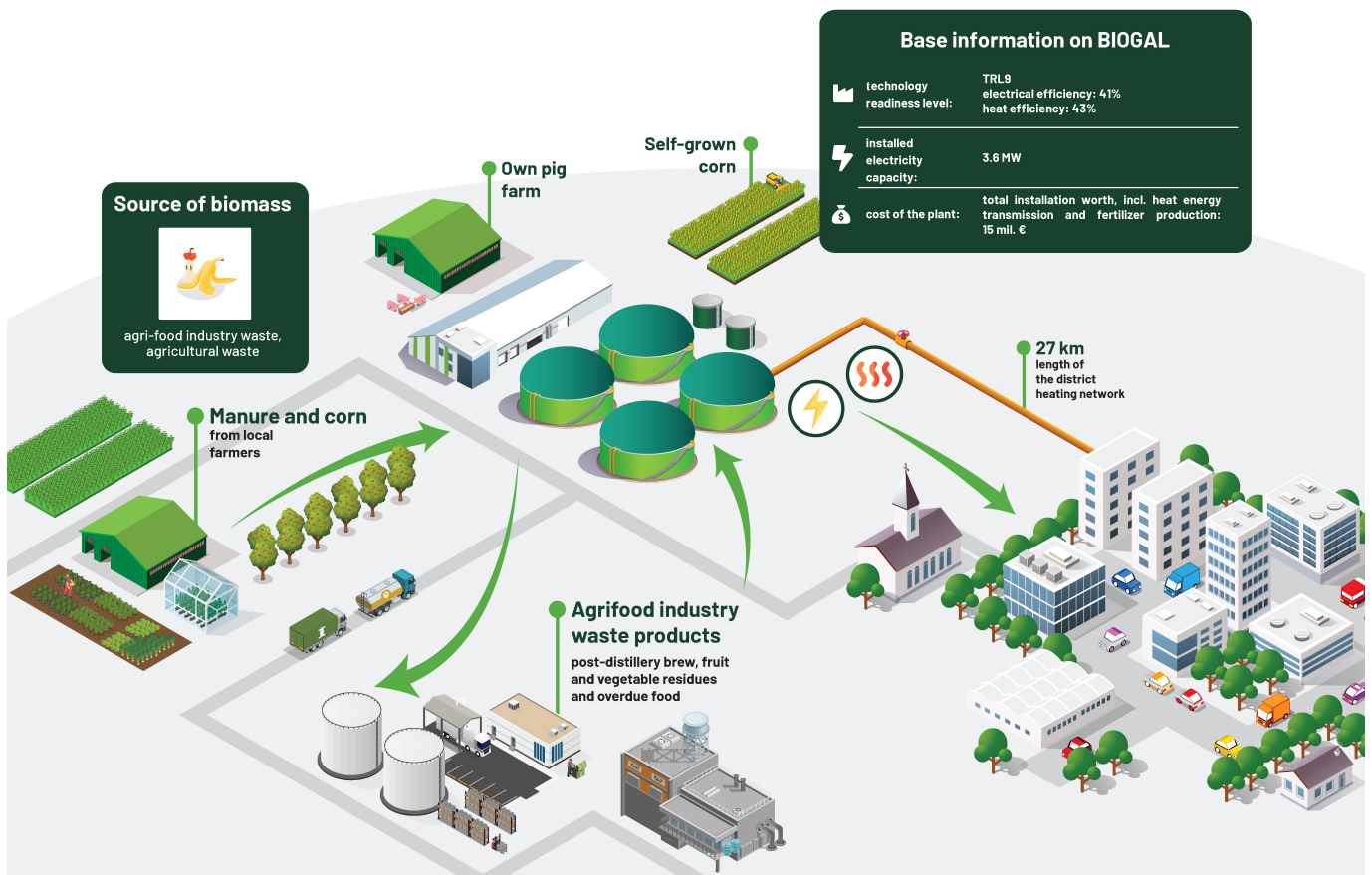


Figure 1. Biogas plant layout. Source: UWM

The company was very aware that pig production imposes a burden on the environment and they employed solutions already existing in Western European countries, i.e. a biogas plant construction and thus disposal of swine slurry. And that is how the idea was born, as Biogal produced quite large numbers of pigs and those in turn generate large amounts of slurry.



It was one of the first biogas plants in Poland, based primarily on solutions typical for Germany, i.e., the Navarro System where the substrates, i.e., corn silage and slurry were coming directly from the farm. Later, this idea was modernized and changed development direction due to the fact that the conditions for this type of installations in Poland began to be unfavorable and they were facing bankruptcy. Therefore, completely different, low-cost substrates needed to be used for methane-based biogas production, i.e. waste products. Also, the market itself forced the expansion – demand for electricity and heat power.



Figure 2. Cogeneration block at Biogal.
Source: BIOGAL.

Introduction of the blue certificate serving to diminish the risk of investments in new generation sources was a milestone in the development of the existing biogas installations. In July 2016, the new authorities introduced new Property Rights for the production of electricity from agricultural biogas called PMOZE-BIO. Later, Feed-in tariff (FIT)/Feed-in Premium (FIP) system was introduced – yet another RES Act amendment.

Motivation for development

At the beginning, the farm specialized in pig production. The owner was aware that it was burdensome for the environment, so technological solutions existing in Western Europe were used. Because the farm produced large amounts of slurry, a biogas plant with a capacity of 1.2 MW was built. It was one of the first biogas plants in Poland. The resulting facility was initially based on German technological solutions. The Navarro System was introduced, which involves using substrates coming directly from the farm for biogas production, i.e. in the case of Biogal, from slurry and corn silage,



Over the years, the facility was modernized. The substrates used so far have been significantly reduced and a low-cost feedstock, i.e. organic waste, has been introduced. Currently, the installation has a capacity of 3.6 MW and is constantly being developed.

The added value of the investment, apart from the production of biogas, is a by-product in the form of ecological granulated digestate fertilizer Naturgal, which has a very beneficial effect on the soil, and also contains an admixture of corn, which, thanks to its large amount of fiber, limits the effects of drought in the soil.

Biogal is constantly investing in expansion, first of all to the waste suppliers network. This way costs of providing heat for residents are reduced considerably, taking into consideration high prices of gas and hard coal – waste heat prices are simply more stable and lower.

Economic-, energy- and environmental perspectives

The electricity and heat generation processes are a result of methane fermentation in agricultural biogas plants, take place in an environmentally sound manner and constitute an innovative form of modern agriculture. However, due to difficult situation in the pork market (i.e. swine fever) the way ahead will not be challenging.

Obtained electricity and heat constitute an effective element of infrastructure development, allowing for electricity supply for Biogal's own needs, for other local farmers, residents and for public sector institutions. However – there still remains a considerable public reluctance due to the odours.

The company obtains raw materials such as manure and self-grown corn from its own pig farm and from other local farmers to produce biogas. In addition, Biogal also processes agri-food industry waste products such as residues from brewing, fruits and vegetables production and overdue food.

In terms of economic aspects – biogas plants allow for energy independence and profit from electricity sales, especially facing high energy costs. However, there are relatively high investment costs combined with still insufficient legal regulations concerning RES.



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In terms of ecological aspects – biogas plants provide groundwater protection, help contribute to reduction of animal production odours spread to concentrated locations, ensure cleaner air and reduced eutrophication of local waters and soils e.g. by improving organic matter content and decrease the carbon footprint of slurry management and biomethane production thus contributing to lower greenhouse gas emissions.

In terms of socio-cultural aspects – biogas plants are more environmentally-friendly than companies using fossil fuels – especially combined with the still not fully exploited huge potential of biogas production in Poland. However, there still occurs some dose of inhabitants' resistance due to generated odours.

In terms of technological aspects – biogas plants take advantage of waste heat which is transferred to the municipal heating network. Furthermore, they store biogas and thus balance the power system operations.

Knowledge transfer potential to other regions

Biogal promotes eco-friendly activities related to on-farm utilization of generated waste. They are also an integral part of mitigating emission effects. The company closes the organic matter circulation at a farm level and is an excellent example of an agricultural biogas plant with a good replication potential. They utilise waste products generated not only on-site but also by other businesses which could lead to forming new partnerships in the future. Emphasising Biogal's openness to visitations and eagerness to share their practical perspective on each investment process stage and employed technology, there is a huge potential of knowledge transfer, including the NTN contribution.

A direct transfer of the know-how and the entire technology proposed above to any region in Poland or in any other European country is possible. Obviously, the exact costs and benefits from using the technology will depend on the factors mentioned above and local economic factors as well as the logistics used in each case.

Summary

The Biogal agricultural biogas plant in Boleszyn, Poland deals with energy production from a combination of renewable sources, waste food products processing, organic fertilizer production (productized under the Naturgal brand) as well as obtaining of wind and solar energy. The company is currently implementing several wind energy investments for local villages and towns.



Figure 3. Study visit to the company. Source: WMODR

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