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Application of 'smallBIOGAS' to 3 pilot case studies in Germany

BIOGAS³

Sustainable small-scale biogas production from agro-food waste
for energy self-sufficiency

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General statements

The tool smallBIOGAS has been tested in three pilot case studies for the next countries: France, Germany, Italy, Ireland, Poland, Spain and Sweden.

The pilot cases presented have been carried out in order to test the tool and evaluate the viability of small-scale AD installations under different scenarios in the mentioned countries. The data used to create the scenarios has been obtained from the questionnaires (task 2.2) and additional companies interested in the project BIOGAS³.

As a result of pilot cases application, all the partners have prepared a list of remarks and comments regarding functionality of the tool, as well as suggestions for modifications. The remarks and suggestions have been - where possible – applied for the tool improvement.

In addition to that, it is possible to identify small-scale AD viable scenarios. Next, it has been included the main conclusions related to viability of small-scale AD as well as a description of pilot case studies in **Germany**.

Supported by a specific feed-in tariff for small scale ($< 75 \text{ kW}_{el}$) agricultural biogas plants, several German biogas companies have developed standardized small-scale biogas plants during the recent years. These standardized biogas plants form an important basis for the cost efficient production of biogas in small scale application. However, it could be concluded that the plants need to be adapted to the specific requirements for the food and beverage industry.

Due to a strong decrease in the fixed feed-in tariffs in Germany the self-consumption scenario is gaining more and more importance for the profitability of small scale biogas plants. It has been shown that in specific cases a profitable operation can be already possible. Nevertheless, a further reduction in investment costs and optimized concepts for self supply are still necessary to apply the small scale biogas concept at a larger scale. As the market for agricultural biogas plants has decreased strongly the biogas plant providers are very interested to offer optimized biogas concepts for the food and beverage industry with the aim to make the plants more profitable and to create further demand.

On this background it can be reasonably assumed that the food and beverage industry will get more and more interested in the small scale biogas concept during the turn of the BIOGAS3 project.

The detail of each pilot case will be presented one by one in the annexes of this document. All are available in German language.

Annexes: Results of the application of `smallBIOGAS` to 3 pilot case studies in Germany (pdf-files)

As a result of the application of `smallBIOGAS`, two pdf-files for each pilot case study have been created. The reference file number includes also the letter 'S' in case of pdf-file with the summary of substrates used for the process of biogas production.

The reference file numbers for Germany are 228-BG3, 228-BG3S, 231-BG3, 231-BG3S, 232-BG3 and 232-BG3S.

Below it has been included a description of the pilot case studies carried out for the participating countries.

Table1. Description of the case studies and agroindustry addressed

Case study						Agroindustry addressed	
Ref. Nr.	Location	Objective	Comments	Substrates	Biogas use	Farm	AFI
228-BG	Rhineland-Palatinate (Western Germany)	The farm would like to generate additional income opportunities through the selling of electricity and heat.	This case includes information of a vineyard located in a typical wine location in Western Germany. The potential substrate consists of grapes (possibly damaged in the process or damaged batches) and pomace, both occurring only once a year in October. So far these residues are used as fertilizer on the fields. Most biogas plants are too large for his substrates, and he does not produce sufficient substrates.	Pulp/Pomace Total amount: 50 t/year	Boiler 8 kW		x
231-BG	Schleswig-Holstein (Northern Germany)	The farm would like to reduce the costs for their high demand of electricity but also generate additional income through the selling of additional electricity and heat. They seek independence from energy providers and market prices and would like to have a positive environmental impact.	The farm in Northern Germany produces potential substrates of about 750 t fresh material of pig manure annually and cultivates the same amount of maize. Whereas the manure accumulates all year round the maize is harvested and stored during autumn. Manure is either brought out to fields as fertilizer or sold to external biogas plant. Maize is either utilized/sold as fodder or sold to external biogas plant.	Pig slurry and energy crops (maize) Total amount: 1 500 t/year	Boiler 75 kW	x	
232-BG	North Rhine Westphalia (North-western Germany)	The goal of the company is to reduce costs and time for waste management and energy demand and to increase their green image.	The agro-food company is a medium sized enterprise with less than 250 employees. There is a continuous production with six production days/week with 12 production hours per day. Potential substrates are residues from onion (main substrate) with a lower amount of other peels from vegetables. So far all residues are given to an external biogas plant. However, the company has a high energy demand of around 700000 kWhel and 300000 kWhth. Up to now the energy carrier oil is used. The most energy intensive part is the peeling of onions through pressure.	Residues from vegetables (onion as main substrate) Total Amount: 3 300 t/year	CHP engine 209 kW		x