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

BIOGAS^3
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 BIOGAS^3.

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 **France**.

As main conclusion, it is important to mention that investment costs for small scale AD are quite high because of the absence of economy of scale in France. Therefore, the profitability is not always reached easily. To make a small-scale AD unit viable in France, the main key aspects to improve are:

- Decrease the investment costs. For example, reuse existing structures (pits, pipelines, etc.), self-construction (concrete slab, etc.), and/or optimization of hot water pipelines for heat valorisation.
- Simplify the technology and the management. For example, the waste/substrate storage tank or the technology used needs to be as simple as possible, in order to reduce expenses (energy consumption, maintenance, labour, etc.).
- Maximize incomes. The sale of electricity if a CHP engine is used will be the most important income. In relation to it, according to the French electricity feed-in tariff calculation, it is important to valorise as much as possible of the thermal energy produced (V>70%) and use more than 60% of farm effluents as substrates to increase that feed-in tariff.
- Digestate management. The digestate management represents an important cost (4 €/t). As there is no market for digestate in France, it has to be spread on lands as close as possible from the agro-food industry or farm or be integrated in a previous treatment already existing.

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

Annexes: Results of the application of `smallBIOGAS´ to 3 pilot case studies in France (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 France are 311-BG3, 311-BG3S, 312-BG3, 312-BG3S, 462-BG3 and 462-BG3S.

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

Table1. Description of the case studies and agroindustry addressed

Case study						Agroindustry addressed	
Ref. Nr.	**Location**	**Objective**	**Comments**	**Substrates**	**Biogas use**	**Farm**	**AFI**
311-BG	Moselle	Evaluate the biogas unit sustainability of collaboration between a farm and an agrofood industry (AFI). Evaluate the interest of an external organic waste on the biogas potential. No waste income because of competition between substrates but it could exist. We suppose AFI is in charge of the transport of the waste to the biogas unit. 30% of subsidies, 70% bank loan.	Biogas unit on the farm (it has been chosen a 200 sows breeding and fattening pig farm which is a French average, and an AFI producing pastry residues from the questionnaire of BIOGAS3 project). There is no cost to transport the manure to the AFI. Easier digestate management on farm fields. The bonus for farm effluents is maximum. Pastry residues have a high biogas potential. The thermal energy produced is used to heat the digester and pig building (partially; 50% of the thermal energy available).	Pig slurry and pastry residues Total amount: 4 150 t/year	CHP engine 58 kW	x	
312-BG	Vendée (based on success story GAEC Bois Joly)	Biogas unit sustainability of collaboration between a farm and an AFI. Interest of an external organic waste on the biogas potential and influence on the profitability of a waste treatment income (15 €/t). 30% of subsidies, 70% bank loan.	Biogas unit on the farm. AFI close to the farm to decrease transport cost. Bonus for farm effluents is maximum. Good co-substrate with manure: fruit waste has a high biogas potential but quickly degraded. The thermal energy will be used on the farm (50%).	Bovine manure and fruit waste Total amount: 1 050 t/year	CHP engine 28 kW	x	
462-BG	Savoie (based on success story Abbaye de Tamié)	Evaluate the sustainability of a 100% AFI effluent biogas unit, without dependence of external substrates. In addition to that, evaluate the interest of the use of the thermal energy in the AFI process. 30% of subsidies, 20% private funds, 50% bank loan.	The whey produced can have a market value. The traditional use of the whey is the animal food industry or the production of powders. However, a cheese factory which doesn't valorise the whey produced usually treats it.	Whey Total amount: 8 000 t/year	CHP engine 72 kW		x