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

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 **Spain**.

It could be concluded that the key of profitability is mainly related to the 'Self-consumption scenario´ in case of small-scale AD units in Spain. In particular, the energy produced should be adapted completely to the needs of thermal energy of the agro-food industry, the needs of energy should be constant during the year and the price of energy (thermal or electrical kWh) should be competitive in comparison with other sources.

However, the transport costs of digestate as well as incomes related to the use of it have also a strong influence on the viability of small-scale AD units.

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

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Annexes: Results of the application of `smallBIOGAS´ to 3 pilot case studies in Spain (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 Spain are 378-BG3, 378-BG3S, 393-BG3, 393-BG3S, 455-BG3 and 455-BG3S.

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

Table1. Description of the case studies and agroindustry addressed

Case study						Agroindustry addressed	
Ref. Nr.	**Location**	**Objective**	**Comments**	**Substrates**	**Biogas use**	**Farm**	**AFI**
378-BG	Milagro (Navarra)	Evaluate the sustainability of a 100% AFI effluent biogas unit, without dependence with external substrates. In addition to that, to evaluate the interest of use of electrical energy in the AFI process. Sale of the heat.	The fresh-cut products include a mix of different vegetables: lettuce, carrot, spinach, escarole, chard and onion. The traditional use of the vegetables produced is animal food industry. Needs of electrical energy for cooling process.	Vegetable waste from fresh-cut products Total amount: 5 000 t/year	CHP engine 89 kW		x
393-BG	Sanchonuño (Segovia)	Evaluate the sustainability of a 100% AFI effluent biogas unit, without dependence with external substrates. In addition to that, to evaluate the interest of use of electrical and thermal energy in the AFI process.	Substitution of electrical and thermal energy (natural gas). Reduction of the investment due to storage tank of natural gas.	Vegetable waste from maize and beet Total amount: 6 000 t/year	CHP engine 139 kW		x
455-BG	Jumilla (Murcia)	Evaluate the sustainability of a 100% AFI effluent biogas unit, without dependence with external substrates. In addition to that, to evaluate the interest of use of electrical and thermal energy in the AFI process.	The management of the sludge has a cost for the AFI. There AFI works continuously and has a strong energy demand. It has been reduced the amount of wastes in order to see the feasibility of a small scale biogas plant. The needs of the AFI are covered partially.	Whey and sewage sludge Total amount: 4 200 t/year	CHP engine 123 kW		x