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## Application of 'smallBIOGAS' to 3 pilot case studies in Italy

**BIOGAS<sup>3</sup>**

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<sup>3</sup>.

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 **Italy**.

In case of Italy, it has been concluded that some issues have to be improved to reach small-scale plant sustainability. Investment costs for small-scale AD are quite high compared to bigger plants because of the absence of economy of scale. Energy storage and management were proven to be not effective, due to the cost of the implementation in small size plant and the power delivered.

Pilot cases were profitable just where is possible to sell the energy, while self-consumption does not show good payback period. Case studied show better results when biomass fed into the digester is self-produced and free, while it is not always sustainable when the by-product has a cost (both if the substrates is bought or sold).

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

## Annexes: Results of the application of `smallBIOGAS` to 3 pilot case studies in Italy (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 Italy are 580-BG3, 580-BG3S, 581-BG3, 581-BG3S, 582-BG3 and 582-BG3S.

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

*Table1. Description of the case studies and agroindustry addressed*

Case study						Agroindustry addressed	
Ref. Nr.	Location	Objective	Comments	Substrates	Biogas use	Farm	AFI
580-BG	Piedmont - Rivoli	Evaluate the sustainability of a biogas plant suited for a livestock farm with a little slaughterhouse. Heat and electricity produced by the CHP engine could be used for company's energy slaughterhouse processes and livestock buildings heat.	This company produces all the substrates (animal dejections and slaughterhouse by-products) in the same place, near the biogas unit. An asset for plant sustainability is represented by the lack of transport costs. Furthermore slaughterhouse wastes can reach high biogas yield potential.	Animal dejections (pig, bovine and poultry) and slaughterhouse residues  Total amount: 1 006 t/year	CHP engine  17 kW	x	x
581-BG	Piedmont - Giaveno	Evaluate the sustainability of a biogas plant for a milking cow livestock farm. Furthermore, this farm processes milk into cheese. Thermal and electrical energy produced can be exploited in dairy process.	This company produces all the substrates (animal dejections and dairy by-products). As for Pilot 580-BG, all substrates are produced near the biogas plant and there is no transportation cost. Thermal energy produced by CHP can be profitably exploited for milk heating process.	Milking cow dejections, cheese whey and cheese waste  Total amount: 2 099 t/year	CHP engine  17 kW	x	x
582-BG	Piedmont - Boves	This pilot case was based on a livestock. Manure and slurry produced by milking cows is used to produce biogas: most of the electricity produced is sold into the grid, while heat is used for substrate pre-treatment and straw drying.	This biogas plant uses only bovine manure and slurry. Energy produced by CHP is used for mixing and pumping systems, the surplus is sold to the grid. Thermal energy produced is exploited for straw drying, a smart way to exploit heat surplus.	Livestock farm for milk production  Total amount: 11 892 t/year	CHP engine  101 kW	x	