

Biogas³: Sustainable and Economical Production of Biogas from Food Waste of European Agrifood Industry



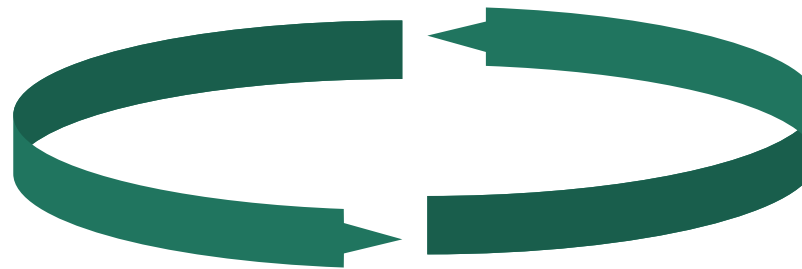
PROJECT GOAL



Co-funded by the Intelligent Energy Europe Programme of the European Union
(Contract No: IEE-13-477)



Food Waste



Agrofood Industry



Renewable Energy

Follow us on:

- <http://smallbiogas.biogas3.eu>
- <http://www.biogas3.eu/eng/>
- http://www.biogas3.eu/documentos/BIOGAS3_D31_Handbook%20smallscale%20AD%20tech.pdf

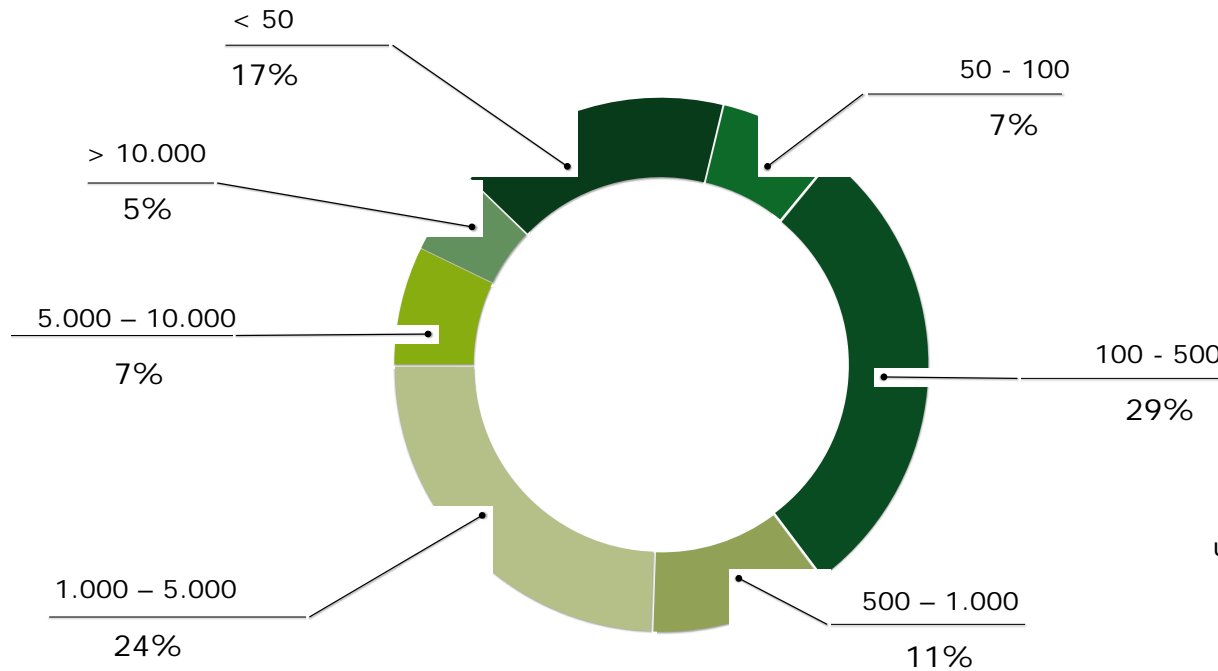


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QUESTIONNAIRES

Biogas³ consortium filled out more than 150 questionnaires from European food industries



Mean = 1950 tons a year

1950 tons of MWh

Milk whey 134

Tomato peels 590

Ruminal content 209

unit of measure
t year⁻¹

Berruto R., Boero V., Busato P., Calvo A., Gomez P., Kachniarz M., Ruiz B., Sopegno A. and Venudo L.



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FROM QUESTIONNAIRES DATA TO DISSEMINATION



Biogas³ Handbook

A tool to disseminate the project info and anaerobic digestion technology was designed. Biogas³ handbook will be used as material for training and for face to face meetings with agrifood companies.



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FROM QUESTIONNAIRES DATA TO FEASIBILITY STUDY

The screenshot shows the 'small biogas' web application interface. At the top, there is a navigation bar with 'New study | My studies | Logout' and an 'Edit study' button. Below this is a process flow diagram with icons for a map of Europe, a biogas plant, a truck, and a Euro symbol. The main content area is titled '12 Type of substrate' and contains several input fields for substrate data, including Category (Manure | Pig), Subcategory, and various chemical and physical parameters like DM (t), CH4 (t), N (kg/t), and Cost (€/t). At the bottom, there is a table listing substrates and their amounts.

Name of the substrate	Amount (t/year)	Mixture (%)
Waste storage Dust silo waste	43	0
Other harvesting waste Discarded grain	17	0
Milling Industry Wheat bran	526	0



Smallbiogas

Questionnaires data gathered from stakeholders were used to setup Smallbiogas[®], a web application that provides Business plans for agrifood industries interested in building a small-scale biogas plant.



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System Dynamics and Innovation in Food Networks
Innsbruck-Igls, Austria. February 9-13, 2015

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small biogas		Viability report	
Economic viability analysis. Financial study of the investment project.			
Financing		1.064.871,24	€
Subsidies		0,00	€
Own funding		319.461,37	€
Loans		745.409,87	€
Percentage of subsidies		0,00	%
Percentage of own funding		30,00	%
Percentage of loan		70,00	%
Interest rate of loan		4,70	%
Financial indicators			
Gross operating profit or earnings before interest, taxes, depreciation and amortization (EBITDA)		127.269,69	€/year
Net present value (NPV)		179.075,68	€
NPV/initial investment		0,168	-
Internal return rate (IRR)		2,33	%
Payback period		8,37	years
Weighted Average Cost of Capital (WACC)		5,90	%
Capital Recovery Factor (CRF)		10,23	%

102 kWe
CHP plant



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Environmental viability analysis

Primary energy obtained from the recovery of the biogas	1.119,78	MWh/year
Savings of CO2 emissions	311,30	t/year
Savings in artificial fertilizers	57508,8	kgN/year
Utilization of the digestate in	Vulnerable area	
Cultivation area required for application of digestate	338,29	ha



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5



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THE POWER OF SUBSIDY

WET Model (with CHP)	Italy	Spain	Ireland	France	Sweden	Germany	Poland
30 kW no subsidies sale of energy	4,56	>15	11,4	>15	>15	>15	>15
30 kW 30% subsidies sale of energy	3,19	>15	7,98	11,01	>15	10,54	13,36
60 kW no subsidies self consumption	8,8	8,29	>15	>15	>15	14,14	>15
60 kW no subsidies sale of energy	5,33	>15	13,3	>15	>15	14,37	>15
60 kW 30% subsidies self consumption	6,16	5,8	12,26	>15	>15	9,9	>15
60 kW 30% subsidies sale of energy	3,73	>15	9,31	12,9	>15	10,06	>15
100 kW no subsidies self consumption	10,94	6,47	12,79	>15	>15	9,01	>15
100 kW no subsidies sale of energy	7	>15	10,17	>15	>15	9,09	>15
100 kW 30% subsidies self consumption	7,66	4,53	8,96	>15	>15	6,31	>15
100 kW 30% subsidies sale of energy	4,9	>15	7,12	11,71	>15	6,37	>15

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CONCLUSIONS

Reached goals

More than 150 questionnaires filled in from agrofood industries

More than 70 questionnaires filled in from plant and components providers

Smallbiogas tool calibrated

Handbook Biogas³

Following steps

Handbook biogas³ translation for dissemination among industries

Webinar, workshop, face to face meetings, face to face trainings

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