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

BIOGAS3 project

International Congress and Expon on Biofuels and Bioenergy,
August 25-27, 2015 Valencia, Spain

Al NIA Technology Centre
Agenda

• Introduction. Small-scale biogas plants for self-sufficiency in agro-food industries

• Objectives of BIOGAS3 project

• Main results of BIOGAS3 project
Introduction. Example of a farm small-scale biogas plant

Dairy farm, Gießen (Germany)

Small-scale biogas plant (installed capacity 75 kW).
Feedstocks: cattle slurry (10,950 m³/year)
Energy use: heat for self-consumption, electrical energy is fed into local power grid.

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<td>Digester:</td>
<td>600 m³</td>
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<td>Biogas valorisation unit:</td>
<td>75 kW</td>
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<td>Energy production:</td>
<td>630 MWhₐ/ a; 740 MWhₗₐ/ a</td>
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<td>Investment:</td>
<td>€500,000</td>
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Estimated payback period = 6 years
Introduction. Cost reduction possibility: Integration of biogas plant
Introduction. To consider

- Availability of area
  - Own area available?
  - Cooperation with other companies?
  - Distance?

- Investment costs
  - Financing possibilities
  - Whole plant or components
  - Possibility of cooperation? (BCM)

- Availability of substrates
  - Cooperation with other processors/farms?
  - Costs
  - Distance

- Provision of electricity and heat
  - Saving potential
  - Substitution of thermal/electrical energy

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Background:

Small-scale anaerobic digestion (AD) is an economically feasible and environmentally sound solution for agro-food waste.

However, AD is not widely implemented in the agro-food sector yet. Why?

The following non-technological barriers have been identified:

- Need of new business models to reduce the high dependency on governmental support to renewable energy.
- Need of scale-adapted technology models.
- Need of energy demand management models.
- Lack of knowledge, skills and confidence in small AD technology
**Objective:** Promote the sustainable production of renewable energy from the biogas obtained of agro-food wastes in small-scale concepts for energy self-sufficiency.

**Main results:**
- Small-scale AD model.
- Business collaboration models.
- Build-up of skills and awareness on small-scale AD.
- Set the ground for new investments.
- Webpage.

**Main impacts:**
- Enabling policy: diagnosis of target groups, improvement of public bodies and policy maker’s awareness.
- Preparing the ground for investment.
- Building capacities and skills.
- Changing behaviour & informing stakeholders.
About BIOGAS³ Activities

Transferring information

1. Diagnosis of Agro-food industry.
   - March 2014

2. Business collaboration models.
   - April 2014

3. Software tool

4. Small scale technology handbooks

5. Training
   - 2 years

6. Face to face activities

7. Communication
   - @BIOGAS3project
   - www.biogas3.eu

Co-funded by the Intelligent Energy Europe Programme of the European Union

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Main results

• Publications (Reports, Handbooks)
• Software tool feasibility studies
• Webinars + Workshops + Visit tours
• Video + Website

Ongoing:

• On-line training + Face-to-face **training**
• Set the ground for new investments of small-scale AD (feasibility studies with the software tool and networking between AFI and biogas plant providers)

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• Report small-scale AD in agro-food companies: potentials and barriers
Barriers identified in the implementation of biogas production in the agri-food sector

The following aspects have been identified through the conducted surveys as the most important barriers for the development and financial viability of a biogas plant:

- **Variability on characteristics** and production time of the residues and other organic substances
- **Logistic costs.** Intermediate stages (e.g. collection, transportation to the plant, storage...)  
- Diversity of technologies for Biogas Plants and perception of available commercial plants are too big.
- **Competition with other products** (compost, landfill, alcohol production, etc.)
- **Energy needs** are sometimes different that energy produced by biogas plants and there are not incentives to sell energy to the grid
- In some countries, **lack of regulation and financing** or subsidies to biogas plants
BI O GAS\(^3\) publications

- Small-scale Anaerobic Digestion Business Collaboration Models (BCM)
Success stories related with the construction of small-scale biogas plant are identified in the countries that comprise the Biogas3 project.
BCM: Private investment. A synergic model is applied for operation of the biogas plant between agri-food companies close to the biogas plant.
SmallBiogas Software Tool & Usage Guide

Key features:

1. General data
   - Name:
   - Country: Ireland

2. Administrative division
   - Mentor:
   - Annual average temperature (°C): 9.3

Additional information:

The results obtained from the use of the tool provide the user an orientation about the viability of a small-scale biogas plant. For this reason, the authors recommend further consultation with expert centres before carrying out a project of biogas plant and are not responsible for any damages resulting from the use made of the tool SmallBiogas.
Feasibility of small-scale biogas plants to promote the installation of small scale biogas plant (ongoing)

smallBIOGAS tool

On-line tool, acces through website of the project www.biogas3.eu

• Interface
• Report
• Functions

Smallbiogas allows to analyze the technical, economical, environmental feasibility of a small biogas plant.

The tool generates a report that will serve the user in making decisions
Results from the use of the tool

Some models of small biogas plants were made with help of the software tool developed in the project.

The models were made with the same substrates and technology.

It may show different results in different countries since the tool calculates parameters based on each country.

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<th>PAYBACK PERIOD (years)</th>
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<td>Italy</td>
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<td>30 kW no subsidies self consumption</td>
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<td>30 kW no subsidies sale of energy</td>
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<th>DRY Model (with CHP)</th>
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* the defined needs of energy are higher than the production of energy from biogas (the software SmallBiogas does not generate results in such cases)
Biogas³ On-line Training

REGISTER TO THE ON-LINE TRAINING THROUGH PROJECT WEBSITE (IN SEPTEMBER)
WEBSITE: Follow-up of all the activities of the project

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Thank you for your attention

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