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EXECUTIVE SUMMARY

DESCRIPTION

BIOGAS³ will promote the sustainable production of renewable energy from the biogas obtained of agricultural residues and food and beverage industry waste (agro-food waste) in small-scale concepts for energy self-sufficiency. This action will contribute to secure, sustainable and competitively priced energy for Europe by promoting new and renewable energy sources and supporting energy diversification.

Anaerobic digestion (AD) for biogas production is a proven technology that is well known in the municipal waste and wastewater treatment plants. It is commercially ready to use and has multiple benefits (energy savings, waste management cost savings, reduction of environmental impact, reduction of carbon footprint, etc.). The same technology can be applied to other organic waste such as agro-food waste. The motivation behind BIOGAS³ is based on the observation that, despite its multiple benefits, AD is not yet widely implemented in the agro-food sector, or its implementation varies extremely between the EU-27 member states. The small-scale AD concept (<100 kW), applied soundly in the appropriate locations, is a sustainable solution from the economic (energy savings due to self-consumption, waste management savings), energy (self-consumption and reduced losses due to near use) and environmental (reduced or zero transport costs for raw materials and digestate, CO₂ emission abatement) point of view.

The project strategy is designed for the target group, the agro-food sector, which is at the same time the energy producer and the demand-side with the proposed scheme:

- First, the needs of end-users in terms of energy demand will be analyzed, as well as the difficulties they encounter when considering to install a biogas production facility.
- Second, the necessary tools to address these needs will be developed according to the gathered information, including business collaboration models, small-scale process design and promotion, energy demand management models, and training to build-up of skills, awareness and networking.
- Third, on-field actions will be implemented to promote this small-scale concept and to bring the developed tools to the end-users, including training sessions (face-to-face and on-line), workshops, webinars, website, etc. A specific programme of face-to-face activities with the most promising implementation sites will be carried out.

BIOGAS³ will produce a significant impact in terms of renewable energies uptake. It will act as catalyst and replication of success, triggering decisions to invest in renewable energy production from agro-food industry waste. Total transferability is guaranteed between participant countries that cover the most relevant regions of Europe in terms of agro-food waste generation. The high relevance of the participants and their dissemination capacity will assure the high visibility of the



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actions, making intelligent energy technologies as widely available as possible. A train-the-trainer approach ensures impacts beyond the actual project duration.

OBJECTIVES

General objective

The aim of BIOGAS³ is to promote the sustainable production of renewable energy from the biogas obtained of agricultural residues and food and beverage industry waste (agro-food waste) in small-scale concepts for energy self-sufficiency.

Specific objectives (during the action):

1. **To identify the end-user needs and difficulties encountered for implementation of AD technology in each participating country.** An in-depth diagnosis will be done in order to clearly identify the particular obstacles present in each country to the implementation of biogas technology in the agro-food sector, specifically for the small-scale applications for energy self-consumption.
2. **To develop sustainable business collaboration models (BCM) between target group and key actors, in order to foster new investments in small-scale biogas plants for agro-food waste.** For the implementation of these business collaboration models, the following supporting tools will be developed:
 - a. On-line software tool '*smallBIOGAS*' for basic dimensioning and sustainability analysis of small-scale biogas installations for agro-food industries.
 - b. Handbook of guidelines and recommendations for feasible waste valorisation through small-scale AD in agro-food industry.
 - c. Face-to-face workshops with the entire supply chain in order to put the key actors and stakeholders together.
3. **To develop and promote small-scale AD models (<100 kW) including energy demand management models** to adapt the energy production to the fluctuating demand of the manufacturing industry. The developed models will be supported by:
 - a. Handbook on small-scale biogas production in agro-food industries.
 - b. Case study sites open to visits.
4. **To build-up skills, awareness and networking.** In order to reduce travel costs and ensure the impact after the project, a train-the-trainers model will be applied. Key actors and stakeholders will be engaged in these activities, not only by receiving the training but also by participating in the contents design and elaboration, and taking part in the networking activities parallel to the training.
 - a. On-line and face-to-face training for target group.
 - b. Workshops for target group and key actors.
 - c. Live webinars oriented to target group and key actors.
 - d. Website.
5. **Set the ground for new investments** through face-to-face meetings with potential AD sites, including sustainability analysis, involvement in technical



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tours, workshops and trainings, and promoting agreements between the target companies and key stakeholders.

Strategic objectives (for the longer term - to 2020):

1. To trigger investment made by the European agro-food sector in renewable energy production with small-scale biogas plants for energy self-consumption.
2. To increase the renewable energy production from biogas with small-scale concepts for energy self-sufficiency.
3. To reduce greenhouse gas emissions due to the consumption of renewable energy sources and to the adequate waste management.
4. To increase governmental support to biogas technology by new regulations on energy self-sufficiency with net balance.

RESULTS

The main **expected results** are:

1. **Small-scale Anaerobic Digestion (AD) model.** Development of a sustainable model based on existing technologies of small-scale AD, including energy demand management to adapt energy production to the fluctuating demand of the manufacturing industry. Handbook describing the model and case studies where it has been applied, presented in national workshops. Case studies open to visits.
2. **Business collaboration models (BCM)** that eliminate the dependency on public subsidies and offer alternative funding opportunities. The model will be detailed in a handbook and presented in national workshops. It will be accompanied by a program to evaluate the sustainability of new small scale biogas plants ('smallBIOGAS').
3. **Build-up of skills and awareness on small-scale AD** through on-line and face-to-face trainings, live webinars, national contact points. Train-the-trainer scheme.
4. **Set the ground for new investments** through face-to-face meetings with agro-food companies with potential to implement small-scale AD, including sustainability analysis, involvement in technical tours and workshops & trainings, and promoting agreements between the target companies and key stakeholders.
5. **Website** dedicated to small-scale biogas technology applied to agro-food industry waste, including information on suitable raw materials, technologies, success stories, etc. All relevant information generated during the project will be available.



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BENEFITS

The main expected benefits are:

1. BIOGAS³ addresses to the key action **bioenergy**, and it will contribute to the increase of sustainable biogas production from agricultural residues and wastes for self-consumption. The approach proposed in the project is fully in line with the call priorities and main concerns:
 - **Sustainability** of bio-resources is maximised since the waste used as feedstock would otherwise be eliminated in landfills. Biogas³ promotes the **recycling** since our raw material is waste.
 - **Minimisation of negative environmental impact** is achieved by the small-scale approach that eliminates or reduces to a minimum the emissions associated to the transport of substrates and/or digestates.
 - **Promotion of self consumption concept** due the project addresses both the demand-side and the production-side, since the target group, the agro-food companies, is both biogas generator and consumer with the small-scale plants.
2. BIOGAS³ aims to provide the elements necessary for the improvement of sustainability of biogas production and use through the application of small-scale concepts for energy self-sufficiency. This will be achieved by setting up the business collaboration models and the widespread dissemination and utilisation of sustainability analysis tool 'smallBIOGAS'. These will help the agro-food companies to implement sustainable systems in their facilities to produce biogas from waste in small-scale plants.
3. BIOGAS³ will also **contribute to the preparation of new legislative** measures that will foster the installation of new small-scale biogas plants in agro-food companies by regulating the self-consumption schemes with net balance. This will be achieved by the materials designed for and contacts made with the policy makers of all participating countries to increase their awareness on the existing barriers for the widespread implementation of the biogas technology in the agro-food sector and their companies.
4. BIOGAS³ will help **boosting investment** across participating countries in new and best performing technologies in the field of renewable energy sources and energy diversification such as small-scale biogas plants. This will be done by creating business collaboration models and small scale technology models and implementing them in networking sessions (workshops + brokerage events) among key actors of the entire value chain. These activities, together with the visit tours (WP4) to showcase successful examples to the key actors, will contribute to a broader market uptake by eliminating barriers related to financial risk and lack of confidence/knowledge of the technology that so far hinder this type of investment.
5. BIOGAS³ will **raise awareness** of all stakeholders of the value chain with the intensive program of training sessions, webinars and workshops foreseen for the second half of the project, and beyond the project termination by the use of train-to-trainer scheme and the maintenance of the BIOGAS3 website. The train-to-trainer scheme applied will allow having trained experts in all the partner organisations, which will be able to replicate the training sessions after the project's termination.



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6. BIOGAS³ will facilitate the **exchange of experiences and know-how among the participating countries** where the biogas technology is at different stages of implementation, thanks to the transnational cooperation. An intensive promotion and spread of best practices will be carried out as well within the training program. **Transferability** of all knowledge and success stories that the project will produce to Europe, as Biogas³ involves countries from all areas of the EU: a major challenge and concern of increased biogas use in many countries and regions.

PARTNERS

ainia
centro tecnológico

AINIA is a Spanish non-profit technological centre formed by companies in the food manufacturing sector and related industries (more than 700 food companies as active members), whose objective is the promotion of innovation and technological development in the agro-food sector.

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FLAB
ALIMENTAMOS
EL FUTURO
2020

The **Spanish Food and Drink Industry Federation (FIAB)** was created in 1977 to represent, through a single organisation and a single voice, the Spanish industry of food and drinks, the first industrial sector of our country. Presently, it encompasses 47 sector associations representing nearly 90% of the sector's turnover.

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 **irbea** | irish
bioenergy
association

IrBEA was formed in 1999 to promote bioenergy in Ireland, from the beginning Anaerobic Digestion has been a core area for the association. IrBEA has a dedicated Anaerobic Digestion Subgroup.

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ACTIA

ACTIA is a non-profit organisation, created upon the joint initiative of the French Ministry of Agriculture and the French Ministry of Research in 1983, and grouping today 28 technical private and non profit centres providing services to French industrial companies in food and drink sector.

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IFIP is the Technical Institute of the French pork Industry. IFIP directed R & D studies on all main issues of the pork sector (Genetics, Breeding Techniques, Fresh and processed Meats, Economy). IFIP is a non-profit organization whose turnover is around 11M€ in 2012.

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The University of Torino (DEIAFA) is one of the most ancient and prestigious Italian Universities. It has about 70.000 students, 4.000 academic, administrative and technical staff, 1800 post-graduate and post-doctoral students and 120 buildings in different parts of Torino and in key places in Piemonte.

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Tecnoalimenti is a SME juridically established as a non-profit research consortium of 28 food sector industries and one financial institution, San Paolo IMI, as trustee of ministerial funds. Its member industries account for 12% of Italian food sales.



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The Renewables Academy (RENAC) AG - based in Berlin provides training and further education for decision-makers, engineers, technicians, sales staff, investors and developers in the areas of renewable energy and energy efficiency.

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JTI - Swedish Institute of Agricultural and Environmental Engineering is an industrial research institute engaged in research, development and information in the areas of agricultural engineering and environmental technology.

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FUNDEKO Sp. J. was founded in 2006 on the initiative of individuals specializing in different fields of environment protection and European funds.

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