biogas 3

Sustainable Small-Scale Biogas from Agri-Food Waste for Energy Self-Sufficiency

Project overview and results
March 2014 - February 2016

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Contract No IEE 13-477

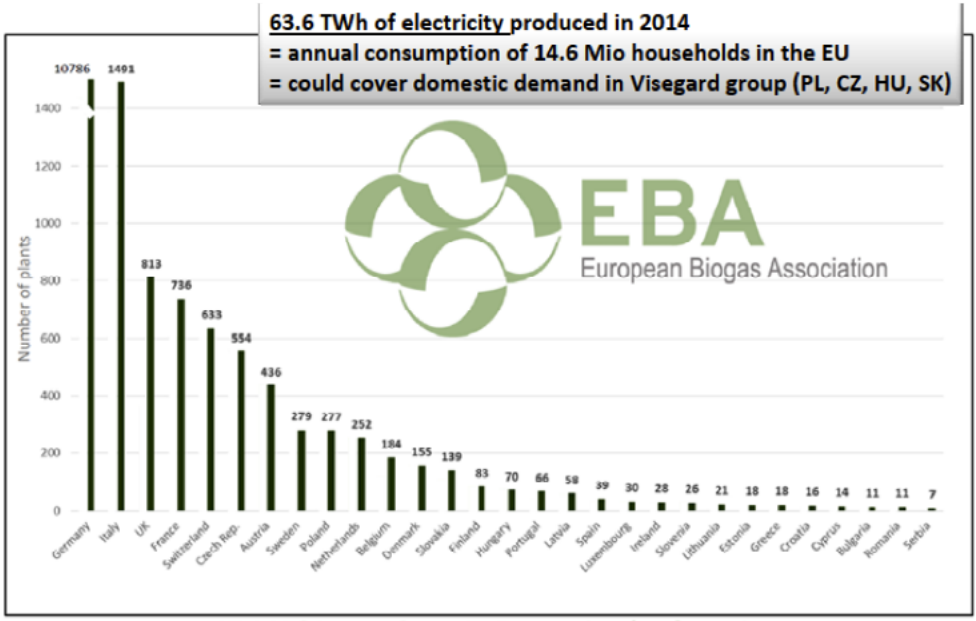
1. About small-scale biogas in Europe

Graphic courtesy of European Biogas Association (EBA)

Producing biogas from anaerobic digestion (AD) isn't new – the technique has existed for thousands of years. Modern versions of the technology are well known in municipal waste and wastewater treatment plants. It is commercially available to use and comes with multiple benefits – energy and waste management cost savings, reducing greenhouse gases, carbon footprint and negative impact on the environment.

By early 2015 there were more than 17,000 biogas plants in Europe. But there are big differences in overall AD uptake between the EU-28 Member States. Germany leads the way with more than 10,000 plants, then Italy with around 1,500. A grouping of 10 countries has between 100 and 800 plants, including UK, France, Czech and Sweden. All the rest have fewer than 100 plants including many less than 50. The total installed capacity in the full year 2014 was about 8,300MWe, and this produced 63.6TWh of electricity – enough to provide for annual consumption of 14.6 million homes in the EU.

The idea of small-scale varies across Europe. To illustrate, in Germany it is generally thought of as <75kWe, in Italy it can be even more than 100kWe, while at the other end Belgium is somewhere between 10kWe and 30kWe.



17 240 biogas plants in Europe (31/12/2014)
Total installed capacity of 8 293 MW_{el}

2. Market challenges and barriers

Europe's food and drinks industry is massive. It employs 4.24 million workers throughout all Member States, mostly in rural areas, 64% of these work in SMEs. As the leading employer in the EU, it also boasts a turnover of over €1 trillion and added value of €206 billion.

Approximately half of all energy consumed in the sector is used to change raw materials into products (process use), which includes process heating and cooling, refrigeration, machine drive (mechanical energy), and electro-chemical processes. Less than 8% of the energy consumed by manufacturing is for non-process uses, including facility heating, ventilation, refrigeration, lighting, facility support, onsite transportation, and conventional electricity generation. Boiler fuel represents nearly one-third of end-use consumption.

The motivation behind BIOGAS[3] 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 Member States.

BIOGAS[3] promotes sustainable production of renewable energy from biogas obtained from agro-food waste in small-scale systems for energy self-sufficiency. The concept combines three elements: energy potential of organic agro-food waste, the anaerobic digestion (AD) technology and energy needs of the agro-food sector. Such a small-scale biogas plant, implemented soundly in appropriate locations, can be sustainable in terms of economic performance, energy management and environment – see *Figure 1*.

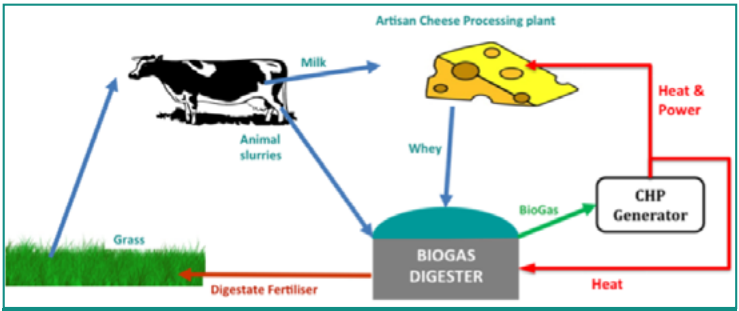


Figure 1: Illustration of how biogas is produced in a cheese plant. Source: IrBEA

Three distinct technology approaches exist for small-scale anaerobic digestion:

i) Self-built, low-tech biogas plants found usually in agricultural environments. Investment and operations and maintenance costs are kept to a minimum, but the efficiency of the process is also reduced.

ii) Standardised small-scale biogas plants with numerous providers in the market specialised in standard solutions for small-scale plants.

iii) Down-scaled biogas plants as "conventional" biogas plant where constructors offer small-scale solutions tailor-made to client needs, for which investment costs can rise.

Although the food and beverage industry produces high amounts of organic waste, the management of this waste is usually externalised and represents a cost for the companies. Many farms in the EU use more traditional forms of managing animal and plant waste, for example slurry spreading on land.

Main barriers

The main barriers preventing the broad application of AD technology in the agro-food sector have elements common to a range of EU Member States, but also have challenges specific to each country. Participants in the seven partner countries of the BIOGAS[3] project identified the following most important barriers to the development and financial viability of a biogas plant (see report 'Small-scale

AD in agro-food companies: potential and barriers' in the section 6 'Finding useful information'):

1. Variable characteristics and production time of the organic waste
2. Logistical costs of intermediate stages (e.g. collection, transportation to the plant, storage, etc)
3. Diverse range of technologies for biogas plants and the perception that available commercial plants are too big
4. Competition with other products (compost, landfill, alcohol production, etc)
5. Energy needs are not always the same as energy produced by biogas plants and there is a lack of incentives to sell energy to the grid
6. Some countries lack appropriate regulation and financing supports or subsidies for biogas plants.

3. Tackling the challenges

BIOGAS^3 tackled these challenges through the project implementing partners representing key actors – including agro-food industry associations, research centres dedicated to the agro-food industry and bioenergy, bioenergy associations, and training and dissemination service providers oriented to renewable energies – in seven countries: Spain, Ireland, France, Italy, Germany, Sweden, Poland. See full list of partners further below.

BIOGAS^3 specific objectives

The BIOGAS^3 project set a framework for the approach to address the non-technical barriers by linking these to five specific objectives, summarised in the table.

Non-technical barriers to AD identified	Specific Objectives of BIOGAS^3
AD isn't widely implemented in agro-food sector	End-user needs and difficulties identified (country specific)
High dependency on government support to renewable energy	Sustainable business collaboration models developed
Small amounts of waste – bigger plants is more common	Small-scale AD models (≤100 kW), including energy demand management models, developed and promoted
Energy consumption is not constant (day, week, month, year)	
Lack of knowledge, skills and confidence in small AD technology among stakeholders	Skills, awareness and networking built up
AD not widely implemented	The ground set for new investments

Table: Relationship between non-technical barriers to AD and specific objectives of BIOGAS^3

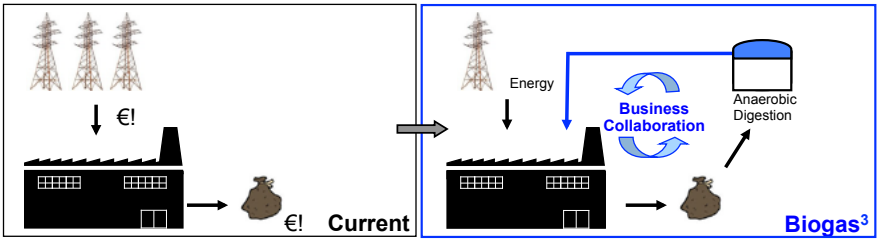
Addressing the specific objectives through activities of the BIOGAS^3 project would trigger investments in small-scale AD plants and increase the amount of biogas produced for energy self-sufficiency, while at the same time reducing greenhouse gas emissions through consuming renewable energy and better waste management. All this would be underpinned by increased government support for biogas technologies through new regulations and support measures. These were the project's strategic goals.

Target group

The agro-food industry has been the main target group – including farms and food and beverage processors. To reach out to these and have effective project delivery, the key actors engaged with/via the project were: a) agro-food industry associations who represent the target group; b) associations representing the biogas sector; c) anaerobic digestion and waste management companies as technology and service providers; and d) stakeholders in public authorities responsible for policy and administration.

Project overview

These two graphics illustrate the change anticipated through the Biogas3 project and the activities to achieve the objective, results and impacts.



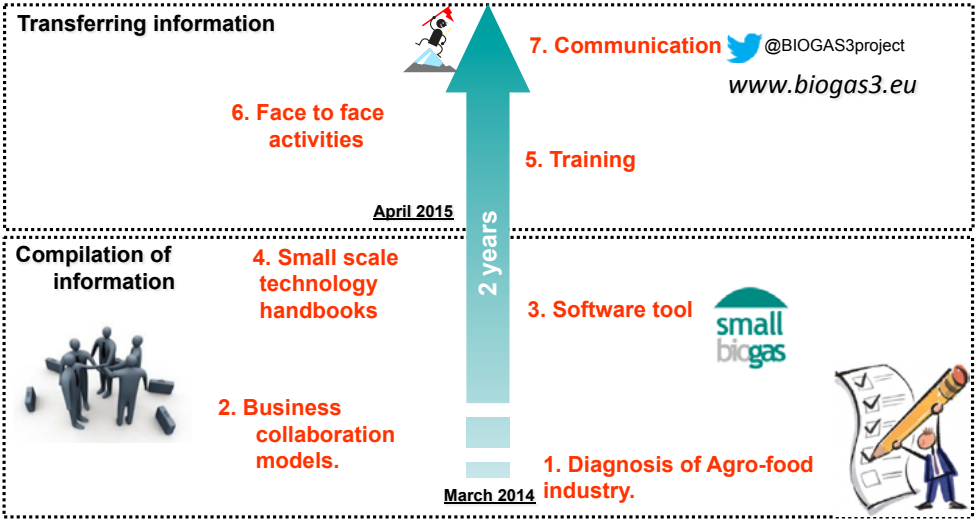
Objective: Promote sustainable production of renewable energy from the biogas obtained from agro-food wastes in small-scale concepts for energy self-sufficiency.

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



4. Significant results

A series of actions were planned and carried out in BIOGAS[3] to improve knowledge and produce useful tools to contribute towards achieving the project results and objectives – and ultimately to improve the ground for greater uptake of small-scale biogas plants in the agro-food sector. The main actions and achievements in relation to the targets are described here.

Sustainable business collaboration models

The three most important elements of sustainable business collaboration models for small-scale AD (≤100kW) are economic feasibility, environmental sustainability and the amount of useable energy produced. But the challenge when trying to identify workable AD solutions for specific farms and food processors is that each farm and business situation has a unique set of features that must be taken into account. BIOGAS[3] took up this challenge by identifying and documenting details for models that can be adapted to the specific agro-food situation.

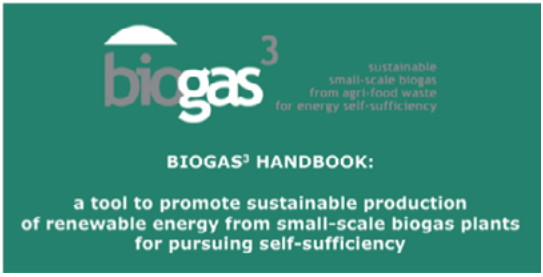
Players within the target group were identified through known channels and sector events, and initial diagnosis and surveys were conducted to find out their energy and waste management needs, and to identify particular keys of success including energy demand management to adapt energy production to the fluctuating demand of manufacturers. The analysis included preparation of a report on legal frameworks, and funding and financial programs and alternatives in the seven partner countries. A questionnaire sent to 1000 companies generated a response from more than 150 participants. In parallel, a report was prepared on potential and barriers to small-scale AD in agro-food companies.

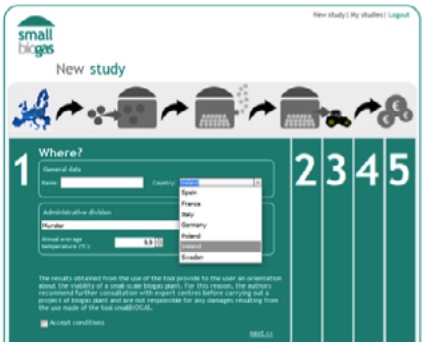
The software tool 'smallBIOGAS' for sustainability analysis, with related Handbook

Information from the diagnosis and reports was used to design the small-scale business collaboration models including preparation of a 'Handbook on Small-Scale Business Collaboration Models' and a software tool 'smallBIOGAS' as a sustainability analyser. The Handbook describes the models and case studies where they have been applied, and these and the smallBIOGAS tool were presented in national workshops. The software was applied to three pilot case studies per country.

Small-scale AD technology model

BIOGAS[3] researched and developed technology models for small-scale AD for the target group. A total of 68 Biogas plant providers were involved in this development. Based on existing technologies, the models identified include all the necessary components of small-scale plants – raw materials pre-treatment, AD, biogas valorisation, digestate conditioning, etc. A crucial part of the model is the energy demand management – adapting the energy production to the demand of the agro-food business for energy self-sufficiency. The sustainability of the model is assessed with the small BIOGAS software described above in conjunction with the accompanying 'Handbook of Small-Scale AD Technology Models'. The Handbook is a tool to promote sustainable production of renewable energy from small-scale biogas plants for pursuing self-sufficiency and contains important information for interested parties on:





- **Substrates** – what by-products and wastes are exploitable for biogas, and how much energy can be obtained from the various types
- **Technologies** – what technologies are needed and available to treat the available substrates and produce biogas, and how to manage the thermal energy surplus
- **Companies/plant suppliers** – how to reduce the costs of a plant, where to access further information, and what suppliers are in the market in the area
- **Models** – how to model a plant on specific conditions, what are the economic and engineering parameters, and tools available to find important information
- **Implementation** – what small-scale plants are currently working, are they profitable, and how they use thermal surplus
- **Legislation** – how to build a plant for a specific enterprise, and where to find laws and permits for specific countries

Energy management model

Compensation for the fluctuation in biogas production can be solved with a biogas storage system. Storage can be used when production and consumption of biogas do not overlap. For example, the agro-food industry may not need electrical energy during all day long and can store the surplus produced. Similarly, biogas can be stored when the digester produces more gas than can be used, instead of burning it by flaring. Storage systems can be temporary installations, so they are very flexible solutions. The most common available storage technologies are:

- Low-pressure storage: this is the most common solution. Floating gas holders, gas bag and floating roofs are typical of this technology and operate at very low pressure (usually <138 mbar).
- Medium-pressure storage of cleaned biogas: the biogas has to be stored cleaned with these pressures, since H2S could corrode the tank components. This solution is rarely used, since the electrical energy required for compression is quite high (usually between 138 and 350 mbar).

The technology proposed for energy management is available but not usable for small plants – the costs are not economically viable within the actual range of incentives for biogas utilization in Europe. Also, given the fixed duration of incentives, it is beneficial for the biogas plant owner to run it as many hours as possible per year.

Skills and awareness build-up

As the main target group is farms and food/beverage processors who did not yet have an AD plant, it was essential to provide tailored training, skills development and information to build capacity for informed decision-making among those interested in small-scale AD possibilities for their businesses. In the BIOGAS^3 project a combination of seminars, workshops, visit tours as well as face-to-face trainings, online trainings and live-webinars was chosen to achieve this. A train-the-trainer seminar was held early in the project.

In addition to information about the objectives and planned results of the BIOGAS^3 project, the training material developed and available (see www.biogas3.eu) includes workshop presentations in the languages of all seven partner countries about biogas production and models, potential substrates and their energy and heating values, available and developing technologies, tools and guidance, publications and sources of information.

Photos of workshop and site visit Kilkenny, Ireland, May 2015

The **workshops** disseminated project information, offered business-to-business meetings between agro-food companies and biogas plant providers and provided forums for discussion about opportunities and results. In total 320 people participated in the workshop and site visit events in the seven countries. Overall there was very positive feedback about these events.

The live **webinars** proved popular – a total of 14 were held in seven languages attracting 389 participants. Most came from the project partner countries with some from wider Europe. They were from various professional backgrounds, mainly agro-food companies, farmers, biogas associations, biogas plant providers, biogas plant owners, agro-food and agricultural associations, research institutes, political stakeholder and consultants. The variety of the audience enabled a dynamic and productive atmosphere during the webinars and facilitated the exchange of experiences among the participants and lecturers. The follow-up evaluations of the webinars indicated predominantly positive feedback from participants.

The **online training modules** were prepared in six chapters, including exercises for participants, covering: i) Introduction to biogas; ii) Small-scale biogas plants in agro-food industry; iii) Technology for small-scale biogas plants; iv) Economics of small-scale biogas plants; v) Legislation framework and financing possibilities; and vi) Best case examples of small-scale biogas plants. In total 459 participants took part in the online training – well in excess of the 180 target.

Overall, there was strong engagement by technology providers supporting the skills and awareness training. Summary details for partner countries are provided here.

Face-to-face activities in Spain

In **Spain**, biogas plant providers included in the handbook of small-scale technology models collaborated actively with the project, including in workshops, face-to-face training and B2B meetings. They also engaged in guided visits providing technical details about small-scale plants and operation, suitable small-scale technology models at national level and current costs, evaluating impact of new Spanish regulations for energy self-consumption, bringing additional agro-food industries into project activities and providing information on real financing possibilities for interested agro-food industries. The Spanish Biogas Association (AEBIG) also supported the BIOGAS^3 project concept in a technical workshop and shared calendar activities among their members to spread information about project activities.

Face-to-face activities in Ireland

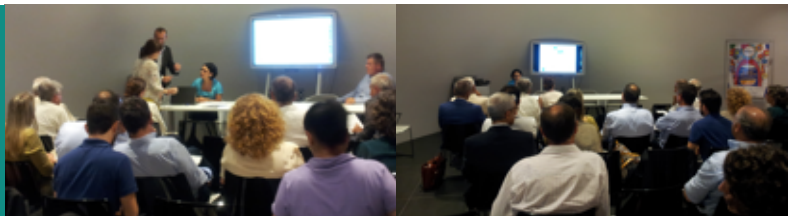
In **Ireland,** biogas plant providers also contributed keenly to BIOGAS^3 training and information activities, particularly the two workshops and site visits, the study visit to the UK and also the online training and webinars. The input from the plant providers was particularly valuable for clarifying technical details for farmers and food processors between the theory and practice of small-scale AD.

Face-to-face activities in France

In **France**, small-scale biogas technology providers and advisers contributed from the audience of BIOGAS[3] national events and at training and information activities during the workshop and face-to face training. The organisation of the visit tour in Temple sur Lot was supported by the manager of a major biogas actor for agro-food industry in France. At this event they presented legal and practical aspects of plant operation, and clarified information on technical details of small-scale AD.

Face-to-face activities in Germany

Right from the start of BIOGAS[3], **German** technology providers have been involved in various activities of the project. A close contact was established to biogas plant providers specialized in small-scale AD technology for agro-food waste during the development of the handbook, in which they were listed. In addition, four technology providers made presentations at the BIOGAS[3] workshops, another four technology providers participated in the face-to-face trainings and visit tours giving valuable input during the discussions and several other companies participated in the webinars and online training. The involvement of the technology providers during the skills and awareness trainings was appreciated by the participants, since it included several practical examples and the vast experience of the providers. Within the online training, they were specifically active in answering questions from the target group in the forum, which often led to direct contacts between the actors.



Face-to-face activities in Italy

Also in **Italy** biogas plant providers actively contributed to BIOGAS[3] events, participating both at the two Italian workshops (as speakers or from the audience) and related visit-tour, to the FtF training event organised in Expo 2015 (from the audience) and contributing to the selection of the site for the visit-tour of 25th Feb 2016. They presented success stories, for improving audience confidence in the AD technology and clarified doubts when questions arose. Very important also their support in deepening: (i) the interest of a company in investing in a very small biogas plant and (ii) the interest of a cooperative of olive-oil producers in the south of Italy for the recovery of energy from pomace through a virtuous model of collaboration.

Face-to-face activities in Sweden

In **Sweden** biogas plant providers and other technology providers were involved in BIOGAS³ face-to-face trainings and workshops as speakers and contributions from the audience. Plant providers have also provided valuable technical and market information to the project, and were informed by the project about the needs and challenges of the agro-food sector for development of small-scale biogas.

Face-to-face activities in Poland

In **Poland,** small-scale biogas technology providers contributed to BIOGAS³ training and information activities during the workshop, face-to face training and visit tour. Their presentations included information on technical details of small-scale AD, legal and practical aspects of plant operation, as well as possibilities for obtaining investment grants.

A summary of the training achievements versus targets for capacity building activities is in the table.

Training/capacity building	Achieved	Target	+ / -
Face to face training	460	180	280
Webinars	389	170	219
Workshops	320	240	80
Online training	459	180	279

Over 1500 interested stakeholders were trained through the capacity building activities of BIOGAS³. The numbers participating in each of the four types of training far exceeded the targets, and this was the situation in all seven of the BIOGAS³ partner countries. This could be taken as a strong indicator that interest in small-scale AD technologies for production of biogas in agro-food companies is high in Europe and the potential for significant investments in this area is high. It also demonstrates the strong demand for capacity building for biogas in the agro-food industry and therefore the entire BIOGAS³ project.

Networking

Networking occurs when a range of players in a particular subject area or market come together to discuss ideas and challenges. In BIOGAS³ this type of interaction took place as an important function of workshops, other trainings and study visits. At these events, farmers and food producers were able to

mingle and discuss investment challenges and possibilities with other sector actors including technology providers, engineers and consultants, co-substrate suppliers, policy makers and energy suppliers. BIOGAS^3 therefore improved the opportunities for and effectiveness of networking between the target group and key actors. These direct contacts contribute to changing behavior and informing stakeholders about investment possibilities.

Promoting real biogas investment possibilities with agro-food companies & farms

The over-arching aim of the activities and results described above was to prepare the ground for real investment in small-scale anaerobic digestion for biogas production. Each of the preparatory actions had an important role improving the investment conditions to stimulate agro-food companies and farms into adopting the AD technologies to manage their waste streams in more environmentally friendly ways and produce usable energy at competitive prices.

To help trigger this, a set of complementary face-to-face actions were undertaken with national stakeholders in the partner countries. Firstly, it involved identifying through project and industry events and normal market contacts the agro-food companies and farms most interested in, and suited to, small-scale AD possibilities. Data for sustainability analysis and feasibility calculations allowed the project partners to screen and select, on the basis of fair and transparent criteria, those businesses most likely and suited to progressing further towards AD investment.

The project also brought together target agro-food businesses and other actors including technology and co-substrate providers and financiers to initiate business-to-business discussions. Training and capacity building activities were conducted in parallel to improve awareness of the various parties for investment opportunities. Final rounds of meetings aimed at setting up business agreements for new investments in small-scale AD. A summary of the face-to-face activities achieved versus targets is in the table below.

Face to Face Activities	Achieved	Target	+ / -
1st round 1:1 meetings	312	270	42
Sustainability analysis	155	128	21
2nd round 1:1 meetings	45	60	-15
Pre-contracts signed	4	10	-6

Table: Face-to-face activities achieved versus targets, n = numbers participating

More than 300 European agro-food industries participated in the programme of one-to-one meetings of the BIOGAS^3 project, while almost 150 sustainability analyses were performed for small-scale anaerobic digesters by BIOGAS^3 partners in the seven countries. Both these achievements far exceeded the target numbers for these activities. These results are positive indicators of considerable interest among agro-food producers about the opportunities for investments in small-scale AD plants to produce biogas for own use.

It can be seen that the numbers of both the 2nd round meetings with target agro-food producers and the total pre-contracts signed by producers by the end of the project fell short of the target numbers. The reason concluded by the project partners is that three of the barriers to uptake of small-scale AD technologies are still significant in some countries – i) the high investment capital cost required; ii) the lack of subsidy support; and ii) insufficient clarity in the legal frameworks. While BIOGAS^3 has been able to make good progress in raising awareness about the need for governments to address these issues in consultation with key stakeholders, further progress is needed. However, it should also be noted here that the awareness raised by the project about small-scale AD possibilities has created a momentum that will continue beyond the life of this two-year project. More on this further below.

Communication and policy outreach

An important part of the BIOGAS^3 project plan was to ensure the communications channels used could make available to potential participants and wider stakeholders the tools and messages about the possibilities for small-scale AD in agro-food. This has been achieved with the set of activities, tools and information generated by the project and which are readily available on the BIOGAS^3 website www.biogas3.eu . The project was also active in communicating information and tools through social networks, articles in technical publications, press releases, leaflets and banners, merchandise materials and a promotional video.

Communication to policy makers was a significant outreach activity. The BIOGAS^3 project embarked on a dialogue with policy makers, to raise their awareness of the benefits of small-scale biogas production in the agro-food industry, to point out the barriers that hinder the development of this sector, to foster the development of new regulations and supports, and to facilitate the authorisation procedures for new installations. Dissemination activities were directed at public bodies and institutions dealing with the promotion of bioenergy technologies, organic waste management and valorisation, as well as those responsible for the programming and distribution of EU and national funds – on both national and regional levels.

BIOGAS^3 achieved more than 1000 social media followers, in excess of 8000 visits to the website, more than 1200 handbooks downloads, and greater than 2000 video viewers. Dissemination at EU level involved two main channels: the European Enterprise Network (EEN) and the European Association of Food and Drink (FoodDrinkEurop). Additionally, other dissemination events made it possible to reach a wider audience at EU level from participating and non-participating countries, such as additional publications, presentation of the project to European university students and international conferences for scientists, among others.

The Final Conference was held in Brussels in collaboration with the BioenergyFarm2 project (www.bioenergyfarm2.eu), and provided good interaction and discussions between stakeholders of EU countries including Belgium, Spain, Poland, France, Sweden, Italy, Netherlands, Ireland, Germany and Finland. Attended by more than 50 participants, it included representatives from research organizations, support and transfer organizations, food companies, agricultural associations, food associations, equipment providers and policymakers. Thirteen presentations focused on small-scale AD in the EU, and included a contribution from the European Biogas Association (EBA) among external speakers.

All the presentations of the final conference are available on the project website along with all the materials elaborated in the frame of the project http://www.biogas3.eu.

5. Ongoing impact and sector progress

Although the BIOGAS^3 project has ended, the awareness and capacity built up and the tools developed will continue to achieve results and impact beyond the life of this two-year project. Indeed, in three of the partner countries – specifically Poland, Ireland and Italy – at least one pre-contract each is likely to be signed in the months following the project close in February 2016.

For example, in Ireland several small cheese companies who have participated in the project are actively seeking suitable AD technologies and are aware of the Irish Government's stated intention to introduce renewable heat and electricity support schemes by the end of 2016. Several farmers with options for nearby heat usage are also actively planning to commission AD plants. Poland had a change of Government in October 2015, and a new law on renewable energy supports has been delayed. When introduced, this is likely to boost interest and uptake of AD technologies in the agro-food sector.

On the wider horizon, as the EU legal framework is further developed in the coming years and as Member States enact related national legislation, commit to renewable energy and emissions reductions

targets and develop plans and incentives to achieve the targets, then the market will respond, including small scale agro-food producers. BIOGAS^3 has produced tools and supporting information, e.g. the smallBIOGAS software tool and handbook, which are legacy resources useful to stakeholders well beyond the life of the project.

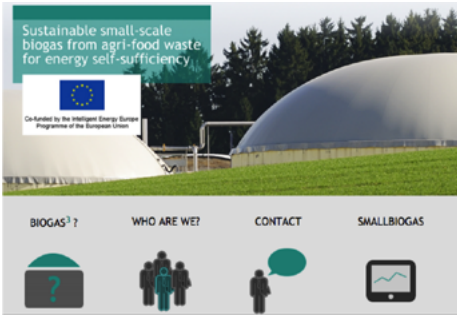
Concluding points

From the range of BIOGAS^3 actions undertaken with the target group and the outputs and results achieved, clear evidence exists to conclude the following points:

1. Interest in AD among the agro-food sector is driven by the possibilities for more efficient energy use, cheaper energy, more cost-effective waste management, diversification of economic activity, quality production of organic fertiliser as a by-product and greening of food products.
2. High interest in BIOGAS^3 project activities came as expected from biogas plant providers including good involvement in facilitation of networking.
3. There is a need for technology providers to provide truly small-scale technologies at competitive prices that will encourage further adoption of AD by agro-food companies.
4. More activities are needed to engage policy makers and facilitate the use of waste products in biogas production and reuse of the wastes after digestion. This could result in better regulation and incentives for the sector.
5. The BIOGAS^3 consortium included representatives of all key actors: agro-food industry associations (FIAB, ACTIA, TCA), research centres dedicated to agro-food industry and bioenergy (AINIA, JTI, DEIAFA, IFIP), bioenergy associations (IrBEA) and training and dissemination specialists oriented to renewable energies (RENAC, FUNDEKO). The strong relevance of the project partners and their dissemination capacity assured high visibility of the actions, making intelligent energy technologies and information widely available.
6. Collaboration between European countries allowed the target group to learn and benefit from the experiences of other countries and to maximum synergies.
7. As a result of project activities, it was possible to achieve 4 pre-contract agreements for the initiation of small-scales biogas plants in the agro-food sector. However, due to the short duration of the project (2 years) and policy changes and delays in partner countries, it was not possible to fulfill the target of pre-contracts agreements. For that reason, it is advisable for other similar promotion project to increase the duration of activities up to 3 years at least.
8. Although the BIOGAS^3 project ended in February 2016, the awareness and capacity built up and the tools developed will continue to achieve results and impact beyond the life of this two-year project. All the public materials developed within the project and included in the website will be available until February 2018.

6. Finding useful information

The BIOGAS^3 website www.biogas3.eu is a legacy resource with information, guidance and tools useful for anyone interested in anaerobic digestion, particularly small-scale AD for the agro-food sector. We encourage you to make good use of it!



www.biogas3.eu

7. Partners in the BIOGAS³ project

AINIA Centro Tecnologico,
Spain
www.ainia.es

La Federación Española de Industrias de Alimentación y Bebidas
Spain
www.fiab.es

Irish BioEnergy Association
Ireland
www.irbea.ie

Le Reseau Francais Des Instituts Techniques De L'Agro-Alimentaire
France
www.actia-asso.eu

Institut du Porc
France
www.ifip.asso.fr

Universita di Torino
Italy
www.unito.it

Societa Consortile di Ricerca Scietifica e Tecnologica per Il Settore Agroalimentare
Italy
www.tecnoalimenti.com

Renewables Academy
Germany
www.renac.de

Institutet för jordbruks- och miljöteknik
Sweden
www.jti.se

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Management and monitoring of the BIOGAS³ project activities was the overall responsibility of the project coordinator AINIA – the Spanish technology centre for the promotion of innovation for the benefit of the agro-food sector and connected industries.

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