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D4.4 Report of the Face to Face Trainings

BIOGAS³

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

Period covered:

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With the collaboration of all project partners

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1 Introduction

Training and dissemination events as well as online courses offer attractive possibilities to share knowledge, spread information and discuss topics with the general public and specific target groups. The variety of training activities is multifaceted and is generally chosen according to the respective topic, the intensity of the courses and the learning goals.

For BIOGAS3 a series of seminars, workshops, visit tours as well as face-to-face trainings, online trainings and live-webinars was chosen in order to facilitate and promote the building up of skills, raising awareness and create networking opportunities.

In order to set a focus especially on the agro-food industry and their stakeholders, trainings were designed to present the project BIOGAS3 and the elaborated results, offer consultancy to the target group regarding possibilities for biogas projects and give further information on the technical, economic and environmental aspects of the implementation and realisation of small-scale biogas plants in agro-food companies.

To improve the status of biogas production in agro-food industries and to further promote the topic in the partner countries, the project partners aimed to inform and involve as many people as possible during the project period.

Throughout the project period from 2014 - 2016 training activities (including Webinars, workshops, visit tours, online trainings and face to face trainings) took place. These events did not only receive a high resonance with numerous participants but furthermore a mainly positive feedback from the participants that attended the courses.

This report will provide the reader with gathered information and reporting on the Face to Face Trainings that have been conducted in all partner countries within the reporting period.

2 Face to Face Trainings

Face to Face Trainings (hereinafter, FtF) were conducted in all partner countries of BIOGAS3: France, Germany, Ireland, Italy, Spain, Sweden and Poland.

To impart a deeper insight into the biogas technology and functionality of the biogas process, one-day visit tours to small-scale biogas plants treating agro-food waste were organized. All participants were invited to join the visit tour.

Within the project period (March 2014 - February 2016) 14 BIOGAS3 Face to Face Training activities were successfully conducted. The following table displays an overview of these and down below further detail of the activities are dwelled upon.

Face to Face Trainings		
Country	Day	Location & Activity
France I	23.06.2015	FtF Training in Sarrebourg
France II	04.02.2016	FtF Training and visit tour to Alberville
Germany I	28.10.2015	FtF Training at RENAC and visit of Biogas Plant in Hennickendorf, Berlin
Germany II	26.11.2015	Visit tour to Friweika Potatoe Production in Remse
Ireland I	30.06.2015	Study visit tour. Visiting 3 biogas plants
Ireland II	16.02.2016	FtF Training in Hillsborough, Northern Ireland and visit tour
Italy I	07.07.2015	FtF Training at Expo 2015 with FabBiogas and Federalimentare at Expo, Milano
Italy II	25.02.2016	Visit tour to a Biogas plant in Solero in

cooperation with Austep		
Poland I	17.11.2015	FtF Training at Podlaskie Agricultural Counselling Centre in Szepietowo
Poland II	17.02.2016	Visit tour at Jarnoltowo plant
Spain I	04-05.11.2015	FtF Training at SEPOR fair in Lorca, Murcia
Spain II	19.01.2016	Visit tour to Kernel Export Biogas Plant in Los Alcázares, Murcia
Sweden I	09.12.2015	FtF Training and visit tour to Östersund, Jämtland in cooperation with Region of Jämtland
Sweden II	22.12.2015	FtF Training at JTI lecture hall Uppsala, visit tour to Jällaskola

3 Face to Face Trainings in Partner Countries

Face to Face Trainings took place in each partner Country during the project period. Each training session was shaped by the local partner and adjusted to their possibilities and with a view to meeting participant's needs and expectations.

FtF Trainings were offered free of charge to participants and included theoretical training with presentations and debate, followed by a visit tour to biogas plants around the respective Countries, aiming at enhancing the focus on the technical features that diverse industries entail for the deploy of biogas technology.

The organization of each FtF Training was adapted to the specific conditions of every partner country: in some cases conducting a one-day FtF training including a visit tour on a second day became impossible due to various reasons, such as the isolated location of the biogas plants, the lack of biogas plants in the proximity of the training

location, or simply the availability of participants, among others. In these cases, a second FtF Training or separate visit tour date was set up. It is noteworthy that the offer of two separate FtF Training days in possibly two separate locations also contributed to reaching a wider target group for each event.

FtF Trainings were promoted by each partner through dissemination channels, such as press releases and social media (Facebook, Twitter, Linkedin, etc.). Additionally, all Trainings were publicized on the Biogas3 and RENAC website. Information on the FtF events were furthermore disseminated during the course of other events whether belonging to the project itself (for instance, during a webinar or workshop session) or other congresses, fairs and national events (during presentations of Biogas3 and business or informal meetings with interested parties).

The promotion of the events usually consisted of an agenda of day, including the expert presentations taking place and, when visit tours were carried out in the same date, the schedule for said activities as well. All pertinent agendas are included in the Report on the Training Materials (Task D4.1).

Registrations for the FtF Trainings was possible through the website of the project, which included links to RENAC's website where participants could fill in their personal information to register. It was also possible to register via e-mail directly with the local partner. All FtF Trainings, including the visit tours were open to all interested parties and free of charge.

In the light of the above, a detail of each Face to Face Training session is offered below.

3.1 France

3.1.1 First Face to Face Training

The first Face to Face Training in France took place on the 23rd June 2015 in Sarrebourg.

The training was organised by ACTIA and conducted by Marie Barthelmy from ACTIA's third party AgriaLorraine. Several speakers were invited as external experts:

- Mme Morello from GrDF
- M. Badoc from the Chambre d'Agriculture de Moselle (Chamber of Agriculture of Moselle)
- Mme Didellot and M. SIEGENFUHR from the council of Lorraine
- M. REIF from ADEME (French organization about environment and energy)

The session consisted of several presentations along the day, starting with an introductory talk about the BIOGAS3 project and later on moving forward to introduce the results of the mapping study on the methanogenic resources of Lorraine, enhancement of bio-methane injection in Lorraine, and a supply plan for implementation of Biogas plants in the agro-food industry which was presented along with the small-biogas software tool, in the framework of a feasibility study for the implementation of a small-scale biogas plant in the city.

In this sense, presentations involved other relevant issues, such as the economic and legal framework applicable to the case study.

The session concluded with a Thematic Group Forum regarding topics such as potential substrates, usage of heat and new projects.

A total amount of 28 participants attended this training: agro-food industries, bio-waste treatment agencies representatives, local council communities with issues to treat/valuate their bio-wastes and wanting to manage biogas projects and current and future biogas units representatives.

The overall feedback was very positive. Given the opportunity to evaluate the performance of lecturers, course organization and course content within a range that encompassed from very good (1) to very poor (5), participants delivered the following results:

		Average
Course Organization	Communication with BIOGAS3 team before the course	1,3
	Provision of information material	1,5
	Training location	1,3
	Assistance / friendliness of staff	1,3

		Average
Course Content	Match between the actual course and your personal needs and expectations	2,3
	Balance between theory and practice	1,7
	Rating of your personal learning progress	1,7
	Timemanagement for practicals / interaction / discussion	1,7

		Average
Lecturers	Knowledge of subjects taught	1,5
	Teaching skills (Understandability of subjects taught)	1,5
	Professional appearance	1,5
	Responsiveness to your questions	1,5
	Use of materials / practical exercises	1,8

What was the highlight of the training? What would you recommend about it?

- *How does biogas work in practice*
- *General overview of methane potential*
- *Meeting with other people, especially firms which follow projects*
- *Identification of the potential of organic substrates for biogas production in Lorraine.*

What could be improved in future trainings? Was there any subject missing?

- *Financing and subsidies for biogas projects*
- *It would be interesting to see business plans and territorial biogas projects.*

The general expectations of the participants have been fulfilled through the training and the presentations of experts as well as the discussions and exchange of experiences was welcomed. Participants acknowledged the balance of the content between theory and practice.

3.1.2 Second Face to Face Training

The second Face to Face Training in France was organized by IFIP, CRITT Agroalimentaire PACA and ACTIA and took place on the 04th February 2016 in Albertville and the objectives of the day were to provide a better understanding of the key issues of biogas, provide some practical experience and determine the benefits of anaerobic digestion for business.

It consisted of several presentations along the day, starting with an introductory talk about the BIOGAS3 project and later on moving forward to the general principles of anaerobic digestion such as substrates, technology and applicable legal regulations; feasibility criteria (and therefore the presentation of the small-biogas software tool for feasibility studies) and calculation of project profitability. Projects and tools related to biogas production completed or currents were presented; for instance: BIOGAS3 project that enables to promote small biogas production unit installation;

VALORMAP project that aims to create a cartography of existing waste mass able to be mobilized and to produce a good yield of biogas; SINOE French database about waste; profitability calculation software of biogas production unit installation, i.e.: instance smallBiogas.

The day concluded with a visit tour to a Biogas plant of the Union of Producers of Beaufort, where the unit manufacturer, Mrs. Sandra Rodière guided the group through the facilities.

A total amount of 9 participants assisted to this event and the overall feedback was very good. Given the opportunity to evaluate the performance of lecturers, course organization and course content within a range that encompassed from very good (1) to very poor (5), participants delivered the following results:

Course Content	Averages
Course Materials	2,2
Speakers Performance	1,3
Length of the Training	1,3
Technical information displayed during the training	1,6

Some of the comments participants delivered were:

- *Thanks, very interesting.*
- *Very nice, balanced day, to time used to discuss was really appreciated. Do not forget to send the presentations.*
- *Good balance between the presentations and the visit tour. The presentation material is missing.*

What could be improved or added?

- *More time should have been allowed to the morning presentation part, in order to have more time to discuss.*



3.2 Germany

3.2.1 First Face to Face Training

On the 28th October 2015 the first Face to face Training in Germany was undertaken in Berlin, at RENAC's facilities.

The morning began with Mr. Volker Jaensch, RENAC's Project Director, who introduced the BIOGAS3 project.

Katharina Hartmann (also from RENAC) followed him. She undertook the topics concerning the feasibility of biogas plants in the food industry, alluding to the best practice examples around Europe. In the course of her speech she introduced the smallBiogas software tool and explained its usefulness towards the realization of feasibility studies for the implementation of small-scale biogas plants.

David Wilken from *Fachverband Biogas e.V.* was invited to speak and delivered a presentation on the applicable legal and regulatory framework and the conditions and peculiarities of the AD process of agro-food residues in Germany.

The day ended with a tour visit to the biogas plant *Hennickendorfer Kompost GmbH*, where participants had the possibility to get to know a dry fermentation plant with an installed electrical capacity of 610kW. The plant digests kitchen, organic wastes and residues from the agro-food industry. The plant operator exchanged his experiences with participants and several topics regarding the legal framework conditions for AD from agro-food residues were discussed.

The training was attended by 8 participants from the following backgrounds: agro-food industry, biogas associations, technology providers and research institutes. Overall the Training was evaluated positively.

Course Organization		Average
	Communication with BIOGAS3 before the course	2,3
	Overall performance of the Training	1,8

Course Content		Average
	Match between the actual course and your personal needs and expectations	2,0
	Balance between theory and practice	1,8
	Rating of your personal learning progress	2,0
	Time management for practice / interaction / discussion	1,3

Field-trip	Average
Hennickendorf	1,8

These were some of the comments participants gave as feedback:

- *Good theoretical and practical information.*
- *Very good organization and time management of the day.*



3.2.2 Second Face to Face Training

This training took place on the 28th October 2015 in Remse, in the East of Germany.

The day started with a visit tour to the *Friweika eG* Biogas Plant, which ferments by-products of their own potato production units (such as potato peels, bad batches, waste sludge). Mr. Michael Gerischer, production director, was in charge of the guidance and offered right after the tour some time for experience debate and discussion. The plant was of special interest to the participants. It is running since 2002 with further installations in 2013. Per day 100m³ substrate is fed into the digesters that produce around 9,000m³ biogas/day. With the produced heat they can cover 40% of their thermal energy demand.

In the afternoon, the group had various presentations from Katharina Hartmann from RENAC about the feasibility of biogas plants projects in the food industry, where the smallBiogas software tool was introduced. Later on the *Federal Kompost e.V.* undertook the exposition of the applicable legal framework and specific regulations for the use of specific substrates in the food and beverage production, as well as certain relevant features of the fermentation process of food and beverage waste. The afternoon ended with time for discussion. Of specific interest were the strict regulations in terms of digesting agro-food residues and the utilisation of digestate in Germany that complicate biogas production for agro-food industries.

The training was attended by 12 participants from various backgrounds; *inter alia*, agro-food industry (e.g. distillery), technology providers, consulting and universities. When given the opportunity to evaluate the performance of lecturers, course organization and course content within a range that encompassed from very good (1) to very poor (5), they delivered the following results:

		Average
Course Organization	Communication with BIOGAS3 before the course	1,3

	Overall performance of the Training	1,1
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		Average
Course content	Match between the actual course and your personal needs and expectations	1,6
	Balance between theory and practice	1,6
	Time management for practice/ interaction/ discussion	1,6

Field-trip	Average
Remse	1,3

When asked to deliver feedback on the highlights of the experience, participants said:

- *Processes and construction of the plant was a highlight as well as the presentation of Mr. Kirsch about the legal and regulatory framework.*
- *The visit tour of the plant was very interesting, I would be further interested in the general and technical functionality of plants.*
 - *There was a good group dynamic, there were good discussions and the presentation of Mr. Kirsch was very informative.*



3.3 Ireland

3.3.1 Visit Tour

The first event regarding the Face to Face Training for Irish participants was a visit tour that took place between the 30th June and the 1st July 2015. This tour was organized by IrBea as a combined event comprising a study tour including several plant visits in Wales (Task 4.3) and a Workshop (Task 4.2).

The visit tour of this Face to Face Training then took place on the 30th June 2015 and consisted on a trip tour where 16 participants had the opportunity to enter and explore three different plants. Participants were mainly representatives of agro-food companies, farmers, researchers and consultants and energy agencies focused on project developments.

First, participants visited an agricultural farm specialised on cattle production (with 120 livestock units). The farm had implemented a biogas plant 20 years ago, where

gas is used to power a 25kWe CHP generator. The tour continued towards a farm with 300 LU cattle, which digester uses slurry, apple pomace, waste strawberries, waste potatoes and maize silage to generate approximately 300 kW of electricity. And finally, the third plant had 2 digesters (from 1990 and 2002) that use cow slurry (280 LU cattle) chicken manure, waste silage, bread waste, animal bedding.



10th February, Journal 8 September 2007

RENEWABLES

BIOGAS PAYS HANDSOMELY IN THE UK

OF THE 2007 renewable energy sources, biogas has been the most successful in the UK, a story of success and failure. In the last few years, there has been a surge in biogas production, although concerns are growing that subsidies will be reduced when the government's Renewable Energy Sources (RES) Act 2001 expires.

Mount Pleasant Farm
The Mount Pleasant farm, near Huddersfield, is a 100-acre farm. It has a 100,000-litre biogas storage tank and a 25kWe CHP generator. The farm produces 100 tonnes of biogas a year, which is used to generate electricity. The farm also produces 100 tonnes of slurry, which is used as fertilizer. The farm is a success story for biogas production in the UK.

What is biogas?
Biogas is a renewable energy source and is made from organic waste. It is a clean, safe and efficient way of generating electricity. Biogas can be used in a variety of ways, including for heating, cooking and generating electricity. Biogas is a sustainable energy source and is a key part of the UK's renewable energy strategy.

Key points

- 1. Biogas is a renewable energy source.
- 2. Biogas is a clean, safe and efficient way of generating electricity.
- 3. Biogas can be used in a variety of ways, including for heating, cooking and generating electricity.
- 4. Biogas is a sustainable energy source and is a key part of the UK's renewable energy strategy.

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3.3.2 Face to Face Training

The actual Face to Face Training in Ireland took place in the city of Hillsborough on the 16th February 2016. It was organized by IrBea, in association with the Agri-food Bioscience Institute (AFBI).

The Face to Face Training summoned 18 participants stemming from the following sectors: agro-food industries, providers and distributors, energy consultants, waste licensing and compliance consultants, and farmers amongst others. The attendants embarked upon a two sessions Training along with the members of IrBea.

The morning session included three expert presentations. The first speaker was from Demetra, an Italian biogas company specialising in lined soil digester tanks by Francesco Panzeri, the CEO of WIS Group, Turnkey biogas plant provider based in Northern Ireland, John Toner had the word afterwards and finally Noel Gavigan took the floor as IrBea executive and introduced biogas production on farm and for food processing and presented the SmallBiogas software tool.

The afternoon session consisted of a site visit to AFBI Hillsborough, an on-farm biogas plant and to Edina CHP manufacturing facility in Lisburn.





3.4 Italy

3.4.1 Face to Face Training

The Italian FtF training took place on the 7th July, 2015 (M17) in “Expo Milano 2015” (Rho Fair). The location was chosen given its very dynamic features, which offered participants the opportunity to get in touch and discuss several topics related to the food industry.

The training was organized as a joint event between two IEE financed projects: Biogas3 (organiser: Tecnoalimenti S.C.p.A.) and FabBiogas (organiser: Federalimentare, *the Italian Food & Drink Industry Federation*). The event was hosted in “Palazzo Italia”, in the core of the Exposition Area.

In terms of agenda, they were scheduled together, but leaving the right space to each project for presenting their own initiative to the audience, while foreseeing some general speeches on biogas, which were useful for both projects.

The event was scheduled in the following order: FabBIOGAS delivered a project presentation (one speech), afterwards the BIOGAS3 project undertook two expert presentations and later on two general presentations on biogas concerning potentiality and perspectives in Italy were carried out, followed by two final success stories by agro-food Companies.

The first speech was borne by the main organiser, Federalimentare. Maurizio Notarfonso welcomed the attendees and presented the European project FABbiogas.

He was followed first by Fabio Sissot of Agriconsulting SpA,¹ who spoke about Biogas as an energy resource to ensure the food supply and then by Nicola Colonna of Enea Utagri², who presented the status, potential and prospects of Biogas in Italy. These reflections were useful and in line with both EU projects.

Remigio Berruto of the University of Torino undertook a presentation entitled “The European project of Biogas3: purpose, virtual case study and market overview”, putting in evidence the objectives of this cross-border initiative, the benefits of biogas, the Italian picture detected by initial investigations directly with business in terms of agro-food wastes and obstacles to the investment.

He was followed by Marianna Faraldi of Tecnoalimenti, who presented the Software *Smallbiogas* optimised by Biogas3 project and made an on-line sustainability analysis simulation, connecting to the project website (<http://smallbiogas.biogas3.eu/>), for providing a practical example.

The success stories were presented to close the event: the first one by Antonio Biancardi of Solana S.p.A, a tomato processing company, who dwelled upon examples of integrated environmental sustainability (their biogas plant is feed with organic by-products, cattle manure and shredded corn) and the second one by Valentina Massa of Dalma Mangimi, who spoke about their satisfactory experience in the respect of the environment.

A total amount of 23 participants attended the event. The audience was variegated, including: agro-food industries (from different sectors, such as, *inter alia*, farms with transformation, feed, meat and vegetables), technology providers, consultants, energy companies, authorities (Lombardy Region), research organisations. Some contacts were taken between the attendees and the organisers, identifying some interested Companies for carrying out sustainability analyses.

¹ Consultant in the environmental field aimed primarily to nature conservation and sustainable development. They carry out studies, research, planning, design and economic planning in the environmental field, mainly for institutions, such as authorities, regions and provinces.

² National Agency for New Technologies, Energy and Sustainable Economic Development. It is the second major Italian research organization. Activities are mainly focused on Energy Efficiency, Renewable Energy Sources, Nuclear Energy, Climate and the Environment, Safety and Health, New Technologies, Electric System Research. Large experience on biogas and biomethane.

Participants, who had the opportunity to evaluate the course content in a range from very good (1) to very poor (5), delivered the following good results:

Course Content	Average
Match between the actual course and your personal needs and expectations	1,8
Balance among speeches	1,8
Evaluation of your learning and interest for the workshop contents	1,7

Some of the comments participants made on the experience were:

- *Clear and exhaustive presentation, very interesting the success cases*
- *Interesting the speech on biomethane and the test "online" of the software tool*

Missing topics and improvements

- *More contribution of the different food chains (just two speeches from Companies).*



3.4.2 Visit Tour

The visit tour to a biogas plant took place on the 25 February 2016 (M24). It was organized by DEIAFA with the support of Tecnoalimenti. Participant who attended the FtF Training in the Expo were invited, but the invitation was extended also to

other contacts. For purposes of facilitating the logistic organisation of the visit, DEIAFA put at the disposal of pre-registered people a bus. The visited plant was located in Solero, Italy, at Eurobios Società Cooperativa.

The biogas plant uses pig slurry, corn silage and green rye silage as feedstock and is functioning since 2012, with an installed capacity of 995 kW (8,5% for self-consumption).

The invitation to the excursion was well received by all 19 participants interested in biogas for professional purposes (farmers, energy consultants, researchers, students). Those participants, who had the opportunity to rate the visit tour offered in a range from very good (1) to very poor (5), delivered the following good result:

Field-trip	Average
Solero	1,3



3.5 Poland

3.5.1 Face to Face Training

The Face to Face Training in Poland was undertaken on the 17th November 2015, in the Centre for Agricultural Counselling in Szepietowo.

FUNDEKO designed and printed out a poster advertising the event. The posters were distributed in the Podlaskie region of the training by the workshop host – the agricultural Counselling Centre of Szepietowo. Likewise, FUNDEKO designed, printed and handed out Certificates of Attendance for all the training participants.

The session began with an introductory presentation in charge of Małgorzata Kachniarz from FUNDEKO about the BIOGAS3 project, basics of biogas production, (including presentation of a scale model of a biogas plant), potential substrates, small-scale self-sufficiency concept for the agro-food industry, market development barriers and development potential, examples of small biogas plants in Poland and in the EU. At the end of this presentation, the Biogas3 video was displayed.

Then, Paweł Kosiński from Bioalians took the floor and talked about the legal and financial aspects of small-scale biogas plants, such as the old and new system of public support to RES in Poland, special provisions related to micro- and small-scale RES installations (eg. plant location, connection to the grid, digestate use, etc.), investment costs, operational costs, profitability analysis of different scale biogas plants (10, 40 and 100 kW), areas of risk and potential sources of financing. Right after, Małgorzata Kachniarz undertook to introduce the SmallBiogas software tool to assess an example of a feasibility study.

In the afternoon, Mariusz Kacała from SOLAR Naturalna Energia talked about the practical aspects of investments in small-scale biogas as inter alia, procedures, permissions, timing, applications for subsidies.

Finally, Małgorzata Kachniarz made a review of small-scale biogas technologies <100kW available in Poland. After the final presentation there was some time available for individual consultations of interested participants.

The event counted with the presence of 25 participants (mostly farmers and agricultural consultants) who have all given a very positive feedback regarding the training. Given the opportunity to evaluate the course organization and content within a range that encompassed from very good (1) to very poor (5), participants delivered the following results:

Course Organization	Average
Provision of information material	1,0
Training location	1,4
Training equipment	1,2

Course Content	Average
Match between the actual course and your personal needs and expectations	1,1
Balance of theory within the course	1,2
Balance of practical learning in the course	1,3
Rating of your personal learning progress	1,3
Time-management for discussion	1,3

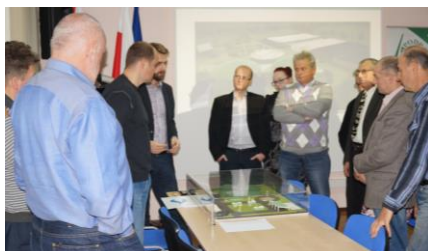
Regarding participants comments, the following aspects were mentioned as the highlights of the Training:

— *Practical aspects of investments, examples of technologies;*

- *Information on possibilities of building small biogas plants on farms, calculation of profitability;*
- *Presentation of the sense of a small biogas plant; Practical knowledge, market analysis; sources of financing, the system of public support to RES, procedures and permissions;*
- *Contact with RES professionals,*
- *Economic calculation;*
- *Investment costs, energy self-consumption.*

Participants were furthermore interested to receive more information from Biogas3 regarding the following aspects:

- *Specific conditions of individual farms (mainly producing milk) in the presentations;*
- *Economy and profitability of small-scale biogas plant.*



3.5.2 Visit Tour

The site visit took place on the 17th February 2016 at Jarnoltowo Plant, which is located at a poultry farm in Warminsko-Mazurskie region, in the Northern part of Poland. The plant has been in operation since 2015. Yearly it uses ca. 4000t of substrates: chicken manure, grass silage (from Nature 2000 grasslands), maize silage and vegetable waste (potato, corn, beans, peas etc.) from a food processing company located in Kwidzyn.

The produced thermal energy is consumed onsite to heat the biogas plant and the poultry house, while the electrical energy surplus is sold to the national grid. The digestate is used as agricultural fertilizer on own fields.

During the visit, the plant owner Mr Łukasz Błażewicz and the technology provider, Mr Przemysław Krawczyk from agriKomp Polska, showed the participants all technological elements, explained the plant operation and daily duties, as well as organizational issues such as substrate delivery.

The visit tour was attended by 19 participants from various backgrounds, such as local and regional authorities, farmers, companies and agricultural consultants. The feedback of these participants regarding the visit tour was very positive: they appreciated the possibility to see all technological parts of the installation, including substrate feeder, engine, pumps, steering panel, etc. as well as to receive answers to all questions related to technology, operation, investment process and financing possibilities. A short discussion on the current legal situation in Poland also took place.



3.6 Spain

3.6.1 Face to Face Training

The Spanish FtF Training took place during the Sepor Fair in Lorca and it was carried out along the 04 and 05 November 2015. The local partner (AINIA) had a stand where Paz Gomez (AINIA), Roberto Giralda (AINIA) and Óscar Bartomeu (BIOVEC, Spanish biogas plant supplier) delivered several presentations regarding the BIOGAS3 project, including: basic aspects of biogas production (Paz Gómez), challenges of implementation of small-scale biogas plants and success stories (Roberto Giralda), economics of small-scale biogas plants (Paz Gómez) and legal aspects applicable to small-scale biogas plants in Spain (Oscar Bartomeu). At the

end of the FtF training, it was possible to carry out 2 face-to-face meetings between a person representing the agro-food company and 2 national biogas plant suppliers.

The FtF training was an open event to anyone who was in the fair and it was announced through the loudspeakers of the fair, local radio from Lorca, press releases and mailing to agro-food companies (involved in the project and other additional contacts). Additionally, staff from AINIA (Paz Gómez, Roberto Giralda, Alejandro Gilabert) contacted all other the companies with a stand in the fair and as a result, it was possible to get additional contacts for the FtF training, to introduce the concept of the project, and to give the option of sustainability analysis services as well as to deliver the leaflet of the project.

Parallel to the Fair, the conference "Simposium internacional of Porcinocultura" was being held in another room. A dissemination event of BIOGAS3 was performed by Concha Ávila from FIAB in the morning of November 4th which included WP6 activities and the FtF Training was therein announced as well.

The first day was the date with the greatest audience with over 70 persons visiting the stand and listening to the named speeches. All and all 98 participants attended the event and evaluated the experience positively. Some of the participants of the FtF training developed in November attended the visit tour afterwards in January and widespread the visit tour among their companies. Consequently, it was possible to engage in said visit tour 6 Spanish agro-food companies.

The success of the FtF training made out of the event a promising networking event that promoted the interaction between agro-food companies and national biogas plant providers.

Course Organization	Averages
Communication with RENAC before the course	2,2
Information/ material provided	2
Was the venue, its design and the equipment used satisfactory?	2,4

Was the location of the course appropriate?	2,4
Help and friendliness of the personnel	1,6
Course Content	Averages
Was the content in the course appropriate according to your needs and expectations?	1,9
Was the theory well balanced according to your needs and expectations?	2,1
Time-management for practice / interaction / discussion	2,5

What was the highlight of the training? What would you recommend about it?

- *The innovation of the topic*
- *Advantages of Biogas.*
- *Biogas plant installation*
- *Technology of biogas generation*

What could be improved in future trainings? Was there any subject missing?

- *Publicity in Universities*
- *Location*





3.6.2 Visit Tour

This guided visit was held on the 19 January 2016 at Kernel Export biogas plant in Los Alcázares (Murcia). This plant digests horticultural organic wastes from Kernel Export Company, laying hen manure, cow manure (animal by-product, category C2) and sludge (animal by-product, category C3) as substrates and its installed electrical capacity is of 370 kW. All the electricity and heat produced is used in Kernel Export Factory. The plant fulfils all the regulatory aspects and has a permit to digest not only their own wastes but also manure from other farms located close to the biogas plant.

Paz Gómez from AINIA made the introduction of the visit, including the possibility of doing feasibility studies for the interested agro-food industries that attended the visit tour. Later on a brief on the goals of BIOGAS3 project was made and Luis Puchades from LUDAN, (a Spanish biogas plant provider of Kernel Export biogas plant) explained shortly the activities of his company and main details of the biogas plant.

The visit tour was guided by both, Luis Puchades and Paz Gómez. During the visit, the biogas plant provider was open to answer the questions from the participants (46 participants from several backgrounds: 6 agro-food industries, waste treatment companies, engineering companies, biogas plant operators, consulting companies and freelance). Staff from AINIA (Paz Gómez, Alejandro Gilabert and Enrique García)

interacted during the agro-food companies during the visit and it was possible to get in touch with the 6 agro-food companies after the event. The visit tour facilitated the networking and afterwards the suitability of a small-scale in their facilities was evaluated, considering the amount of wastes generated. In particular, it is important to highlight that one of the companies included in the one-to-one meetings participated in the visit tour and a second-round meeting was planned during the visit. However, several weeks later, this company postponed the meeting after February 2016 due to internal policy priorities changes.

When asked for feedback in relation with biogas plant technology and possibilities of implementation in their facilities, the response was very good. In particular, two participants said:

- *The visit was very interesting. In fact, we will be interested in the sustainability analysis, so please, send to us the questionnaire. In particular, we have currently a high cost related to the waste water of our plant. We would like to evaluate the possible implementation of biogas technology in our food industry. (Agro-food Company).*
- *We think this technology could be interesting in order to improve our corporate image. Currently we treat our liquid effluents following regulations of waste water Management. At short term we do not see possible to implement biogas technology in our company due to low amount of organic waste generated in our industry. (Agro-food Company).*





3.7 Sweden

3.7.1 First Face to Face Training

The Face to Face Training was conducted in December 9th 2015 in Östersund, Jämtland in cooperation with Region of Jämtland and representatives from the horse sector.

The session started with a presentation on biogas production in Jämtland by Ida Sjölund from the Region Jämtland Härjedalen. Later on Jan Quicklund from Östersundstravet undertook a presentation on racetrack manure in Östersund.

Henrik Olsson from the Swedish Institute of Agriculture and Environment (JTI) finalized the session with a wide encompassing presentation about how biogas plants based on horse manure operate. This included how the process work, experience from the digestion of horse manure and advantages and disadvantages of biogas, as well as other alternatives. Moreover, he presented the smallBiogas software for feasibility studies.

Participants at the training session ranged from horse facilities, plant suppliers, farmers, consultants and biogas plants owners to university students, politicians and governmental authorities. A total amount of 20 participants assisted to this session and given the possibility to rate it within a range that encompassed from very good (1) to very poor (5), participants delivered the following results:

Course Organization	Average
Communication with RENAC before the course	2,28
Was the venue, its design and the equipment used satisfactory?	2
Was the location of the course appropriate?	1,57

Course Content	Average
Was the content in the course appropriate according to your needs and expectations?	2,57
Was the theory well balanced according to your needs and expectations?	2,71
Was the discussions and examples appropriate based on your needs and expectations?	2,28
Time-management for practice / interaction / discussion	2

What was the highlight of the course? What would you recommend about it?

- *The summary that Ida did when she had to tie things up.*
- *More understanding of how a biogas plant works.*
- *That you can use horse manure to biogas, even if one does not thought that the possibility existed. Coordination between those who have working biogas plants and those with horse manure that they want to get rid of at a reasonable cost.*
- *That so many could come and that the interest is so great, did not believe that.*

What could be improved in future courses? Were any topics missing?

— *Focus on cost is important, especially in the equine industry where too many are struggling with the economy.*



3.7.2 Second Face to Face Training

The second Face to Face Training in Sweden took place on the 22nd December 2015.

The morning session begun with a site visit to a biogas plant in Jällaskola, equipped with a 500 m³ digester for liquid manure that produces 600,000 KWh/year. It is the first small-scale biogas plant that Uppsala has invested in, to demonstrate the feasibility of smaller biogas plants as a possible energy source for agriculture and farms.

The afternoon session was held at JTI lecture hall in Uppsala, where participants were presented with two presentations on opportunities and challenges of biogas production by Henrik Olsson and his colleague Mats Edström, both from JTI.

Both presentations were concerning the possibilities of implementation in the Municipality of Heby. The first one encompassed the advantages and disadvantages of different substrates as well as challenges and obstacles in the planning of a biogas

plant (e.g. scale substrate amounts, provision of gas, digestate) in the context of which the smallBiogas software was introduced.

The second presentation involved economic cooperation models and other economic aspects such as funding and project financing.

The discussions during the training focused on the possibilities of building small-scale biogas plants in Heby. The debate took place between a group of representatives of slaughterhouses, tannery, farmers, horse facilities and Municipal authorities. A total of 6 participants joined JTI researchers in this event.

The attendants were given the possibility to rate it within a range that encompassed from very good (1) to very poor (5), participants delivered the following results:

Course Organization	Average
Communication with RENAC before the course	1,67
Was the venue, its design and the equipment used satisfactory?	1,33
Was the location of the course appropriate?	1,5

Course Content	Average
Was the content in the course appropriate according to your needs and expectations?	2
Was the theory well balanced according to your needs and expectations?	2,5
Was the discussions and examples appropriate based on your needs and expectations?	2,33
Time-management for practice / interaction / discussion	1,17

Lecture at JTI in Uppsala and Visit Tour to Jälleskola	Average
	1,3



4 Conclusion

The Face-to-Face Trainings proved to be an excellent tool for the transfer of knowledge of small-scale biogas plants implementation in the agro-food industry for energy self-sufficiency.

In the time-frame of the BIOGAS3 project, 14 FtF Training events took place in all partners countries, that is to say: France, Germany, Ireland, Italy, Poland, Spain and Sweden. Participants from a very wide range of professional and academic backgrounds, *inter alia*: agro-food companies, farmers, consultants, researchers, waste management companies, suppliers, distributors, energy agencies, anaerobic digestion or biogas associations, university students and governmental authorities.

The support of local stakeholders allowed partners to enlarge the scope of Trainings, given that the former contributed greatly in the provision of practical knowledge: during the Training sessions for instance, biogas and anaerobic digestion technology providers shared their expertise (e.g. BIOVEC in Spain) and, during the visit tours, farm owners disclosed their practical experience in order to enhance the understanding of the attendants in the specificities and technicalities of a functioning plant. In some countries, the FtF activities included lecturers of national stakeholders like for instance representatives from Biogas Associations (e.g. Fachverband Biogas e.V. in Germany) who spoke about the current legal and financial framework situation in the respective countries. Due to the vast experience of the national stakeholders as well as the involvement of practical examples, participants appreciated the practical aspects of the trainings.

The diversity of the audience enabled a dynamic and productive atmosphere, since it facilitated the exchange of experiences among the participants and lecturers.

The overall positive feedback of each training demonstrated the satisfaction of the participants regarding not only those trainings that were conducted along with site visits, but those which enabled networking as well. FtF trainings were set in very strategic points where relevant stakeholders were at reach and participants had the

opportunity to meet and create business bonds with each other and said interested parties.

The combination of a hands-on training as well as a visit tour to successful implemented biogas plants offered an appreciated mixture between theoretical and practical knowledge transfer.

The high number of participants of in total 347 people involved in these FtF Trainings demonstrates the strong demand for capacity building for small scale biogas plants for self-sufficiency and in particular, in the agro-food industry. Thanks to the contribution and involvement of all project partners regarding not only the means of promotion of the Trainings, but also the careful selection of venues and places where they were carried out and which parties to engage, the Trainings were successfully implemented in all member countries of BIOGAS3, which is clearly echoed by the high interest of an amount of participants that exceeded initial expectations.