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Table of Contents

1.	INTRODUCTION – SCOPE OF THE DOCUMENT	1
2.	BIOGAS COMMUNITIES IN GERMANY.....	2
2.1	Obereschach Biogas Community	2
3.	BIOGAS COMMUNITIES IN GREECE	5
3.1	“NEOGAL” Biogas Community	5
3.2	“Leda Maria” Biogas Community Energy.....	10
3.3	“Prespa” Biogas Community.....	16
4.	BIOGAS COMMUNITIES IN UK.....	22
4.1	“Hockerton” Community.....	22
4.2	“Lincoln” Community	28

1. Introduction – scope of the document

The scope of the following document is to provide a presentation concerning the Biogas Community initiatives that are under development in three targeted regions (Baden-Wurttemberg, Central and Eastern Macedonia & Thrace and Yorkshire and the Humber) in Germany, Greece and UK respectively.

First, a short description of communities` profile is presented, providing information on communities` administrative structure, location, regional and national economic and legislative features, stakeholders mix, current community`s biogas awareness, biogas power capacity and potential biogas derived financial and environmental solutions.

Second, a comprehensive description of communities` vision on biogas initiatives is provided alongside with the strategy that will be mainly followed to accomplish its goals. Subsequently, communities` action plan will be presented containing the timetable of the scheduled actions to be implemented at the first 18 months of communities` activities. ISABEL support services that will be offered to communities` administration are described for each action separately.

2. Biogas Communities in Germany

In the following we describe the biogas community of Obereschach in detail. Other biogas communities hopefully evolve in Bräunlingen and Neukirch in the near future!

2.1 Obereschach Biogas Community

2.1.1 Description of the community

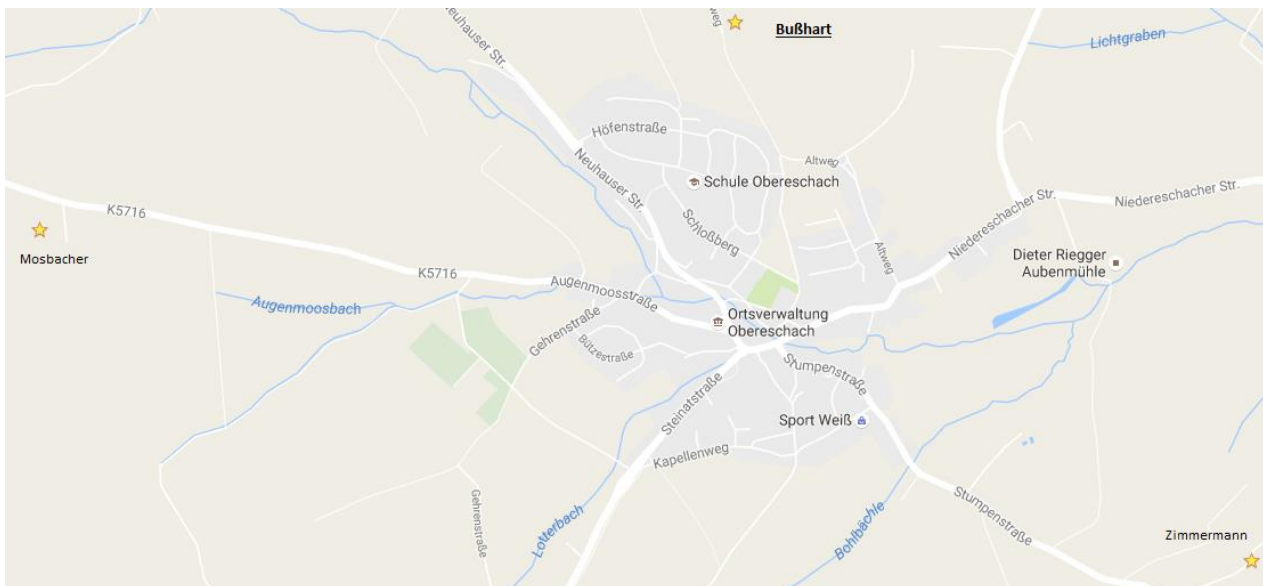
Location and boundary of the community.

Obereschach is a borough of the district capital Villingen-Schwenningen (VS) in the Schwarzwald-Baar district. It is about 8km away. Obereschach lies about 760m above sea level and has a temperature average of 6, 7 Celsius. Obereschach lies in Black Forest and is characterized by strong winters.

Obereschach was once a rural village with many farms. Since the incorporation as borough to VS in the year 1971 it became attractive for persons who work in VS and who wished to have a house in the countryside. Infrastructure (schools, public transport) helped to develop the village and number of inhabitants raise from 1.000 in the year 1970 to 1.700 today. A majority lives in family houses with large gardens.

Agriculture reforms and a switch to an industrial and service oriented society had the consequence that many traditional farms passed by.

Biogas is an important farming sector in Obereschach. Three biogas plants are currently located in Oberschach:



City plan Obereschach with biogas plant:

Mosbacher – 170 kW_{el}
 Zimmermann – 75 kW_{el}
 Bußhart – 230 kW_{el}

The Bußhart biogas plant lies 500 m from the village boundaries of Obereschach. The operator contacted LCF and expressed his wish to cooperate. The biogas plant operates since 2004.

In Obereschach 12 persons participated at the first workshop organized by LCF to initiate a biogas community. Five persons are members of the village council, all three local biogas plant owners (farmers) attended and four citizens followed the invitation to the workshop.

During the workshop the participants expressed their wish to be at first informed about the biogas production of the biogas plant of Mr. Bußhart.

The already existing biogas plants are getting closer to the end of the fixed feed-in tariffs and are searching for future perspectives to run their plants. Broader citizen involvement and the use of green cuts / organic waste as feedstock could be a sustainable and cheap way of producing heat for a district heating.

So far the biogas plants and local solar panels produce 150% of local power demand. Heat from the CHP is hardly used so far and could provide a considerable share of the needs (approx. 50%) in winter time and almost 100% during summer time for hot water needs.

Further renewable energies e.g. wind power play an increasing role in the mountain area of the black-forest. Also the use of wooden biomass from forestry is on a high level. Almost every household uses firewood. Future strict legislation on air pollution will reduce the use of firewood in private households. This fact can be of great importance when the biogas-community develops a district heating model.

The end of fixed feed-in tariffs for biogas plants can be on the one hand a great opportunity to initiate a biogas project. The short duration of fixed feed-in tariffs on the other hand (less than 10 years), makes investments of large scale projects like district heating more complicate. Currently the heat of a CHP unit is considered as waste energy with low value and stands in competition with cheap fossil fuel for heating. For the development of a district heating system the heat source has to provide cheap energy.

A local and efficient way of organic waste management can be an important source of cheap biomass that isn't developed yet. Also the legislation must be adapted to realize projects.

In the case of Obereschach biogas plants already exist. Because of a low price for milk the feedstock from cattle won't increase in the near future. Rather because of a low price rate for farming products the biogas plants have to adapt their biogas production. Due to the ending of fixed feed-in tariffs re-structuring of the farm seems obviously requested.

Organic waste could be used as feedstock and close the gap in decreasing animal farming.

A practical challenge if a district heating project is developed in Obereschach, will be to attach the public buildings, which usually have great need for heat because they were recently equipped with new wood pellet burners.

2.1.2 Community's Vision and Strategy

Unfortunately, the comprehensive workshop organized by LCF in Obereschach, aiming to initiate a biogas community, hasn't accomplished to define a detailed biogas community vision.

ISABEL partner LCF will follow a number of steps for the successful realization of biogas community's developed vision.

First of all LCF will create and distribute among the participants of the workshop a results protocol providing aggregated information on workshop discussions. Additionally, LCF will open an on-line survey, in cooperation with village council, targeting to involve a broader base of relevant stakeholders. As a tool to further stakeholders engagement an excursion to a bioenergy village will be used to show a good example of a biogas plant community with application to district heating. Furthermore, LCF will exploit the on-line survey's results to feed productively the next village meeting on issues concerning the potentialities that can be provided to local community by a development of sustainable biogas community solutions. Then, LCF will match the expectations that emerged from workshop with possibilities of existing biogas plants. Finally, LCF is planning to collect additional information on main topics (heat, residue/waste) that will be critical for a successful implementation of sustainable biogas community solutions.

2.1.3 Community's Action Plan

Action	Description of action	Due date
1.	Results protocol for participants of workshop	December 2016
2.	Online survey to involve a broader base and more stakeholders <ul style="list-style-type: none"> ▪ Sending out in cooperation with village council 	January 2017
3.	Excursion to a bioenergy village to show a good example	February 2017
4.	Next biogas community meeting <ul style="list-style-type: none"> - presentation of survey results - inauguration of biogas community 	February 2017
5.	Matching expectations from workshop with local and regional possibilities	March 2017
6.	Collecting additional information on the main topics (heat, residue/waste)	1. Semester 2017
a)	▪ Information on heating potential -> questionnaire for citizens	
b)	▪ Information on business options/models -> e.g. cooperative	
c)	▪ Researching legal conditions for waste management	
7.	Contacting local waste management businesses and creating a concept for organic waste management in cooperation	2. Semester 2017
8.	Evaluating technical potential of existing biogas farms for waste utilization	2. Semester 2017
9.	Evaluating the potential in the region together with the district administration	1. Semester 2018

2.1.4 ISABEL Support Services in Action Plan implementation

Action	ISABEL support (LCF)	Due date
1.	Results protocol	December 2016
2.	Survey to involve a broader base and more stakeholders <ul style="list-style-type: none"> ▪ Design of survey ▪ Evaluation of survey 	January 2017
3.	Excursion to a bioenergy village to show a good example <ul style="list-style-type: none"> - Program and organization of excursion - Thematic input 	February 2017
4.	Presentation of online survey results	February 2017
5.	Matching expectations from workshop with local and regional possibilities <ul style="list-style-type: none"> - Bachelor thesis of trainee 	March 2017
6.	Providing additional information on the main topics (heat, residue/waste)	1. Semester 2017
a)	▪ heating potential -> preparing questionnaire for citizens	
b)	▪ Information on business options/models -> e.g. cooperative	
c)	▪ Information on legal conditions for waste management	
7.	Contacting local waste management businesses and creating a concept for organic waste management in cooperation	2. Semester 2017
8.	Evaluating technical potential of existing biogas farms for waste utilization <ul style="list-style-type: none"> - support for the farmers 	2. Semester 2017
9.	Organizing the contact to the district administration	1. Semester 2018

3. Biogas Communities in Greece

3.1 “NEOGAL” Biogas Community

3.1.1 Description of the community



The **Cooperative Dairy NEOGAL** (<http://neogal.gr>) is located in the Drama County (Central Macedonia – North Greece). It was founded in 1964 by the Union of Dairy Cooperatives of Drama/Kavalla Counties (40%) and the Agricultural Bank of Greece (60%) focusing on the collection, treatment and disposal of cow/sheep/goat milk from the neighbouring counties in the local market. Since 1997 the company's share capital opened for its employees and milk producers from the region.

Currently, NEOGAL is run by a Boarding Council which is elected by the shareholders General Assembly. It is a financially stable company and its product portfolio includes a wide range of dairy products (i.e. several types of milk, cheese, yogurt and ice-cream) which are sold in major cities and areas of Greece (e.g. Central and Eastern Macedonia and Thrace, Thessaloniki, Attica-Athens) and abroad (e.g. Italy and Germany).

Aiming to support constantly its business expansion, the company invests to close collaboration with breeders regarding the implementation of modern technological solutions for milk production and treatment to secure high quality products at high production rates, while it constantly expands its distribution network.



Drama county - Region of Eastern Macedonia

3.1.2 Community's Vision and Strategy

NEOGAL envisions being a model dairy industry which supports the regional community's vision to have a sustainable future both from financial and environmental point of view. Therefore, the company is committed to:

- Keep an innovative attitude concerning the modernization of its industrial infrastructure;
- Consult local breeders to low cost operation procedures;
- Invest to high quality for its products and continuously expand its distribution network;
- Improve its production procedures from a technological perspective towards lower energy consumption; and
- Apply innovative livestock and dairy waste management procedures to improve the environmental footprint of its operation contribute to better quality of life for the region.

Especially for the latter, NEOGAL is highly interested in investigating the potential of building a biogas plan to address multiple goals:

- ✓ Compliance with national and European legislation regarding livestock breeders' and NEOGAL dairy waste management
- ✓ New sources of income for its shareholders (i.e. livestock breeders and employees) through the production of biogas renewable energy (electricity) and heat; and
- ✓ Free use of biogas plant's digestate (organic fertilizer) to its members' farms

Finally, NEOGAL biogas community developed an effective action plan for the first 18 months of its operation, paving the ground for a successful future realization of the community biogas plant initiative.

3.1.3 *Community's Action Plan*

The members of the Board in collaboration with ISABEL partners agreed on a specific set of actions for the next period to collect further information on the potential of building a biogas plan. In addition, they set a number of milestones to ensure that the validity of their planning within the overall socio-economic environment at both regional and national level. The regional ISABEL partners (Q-PLAN and EBW) will be supporting the implementation of this action plan and closely work with NEOGAL offering them the necessary input and tools. More specifically, the following actions were designed:

Action 1. Set up of Biogas Community (M1-M3)

The members of the Board will inform all the region's breeders as well as any other interested stakeholders (e.g. local authorities, associations and clusters) on their intention to create a Biogas Community and communicate its socio-economic, environmental and legislative aspects. A Community's inauguration event will be organised in order to:

- Identify the initial members of the community;
- Agree on a position paper outlining the Community's vision and strategy;
- Agree on the Community's organisational principles and key actors that will act as information hubs collecting the necessary information for the biogas plant and ensuring that this information is shared among the members of the Community to jointly take actions; and
- Confirm the list of actions to be followed during the next period for the effective realisation of its vision.

ISABEL contribution: ISABEL partners will actively be involved in the discussions and share their knowledge on the operation procedures from similar initiatives as well as support the preparation of the Community's position paper.

Action 2. Dimensioning of potential biogas plant (M4-M6)

An initial and critical issue the Community needs to address refers to the potential power capacity of the biogas plant based on the available biomass (e.g. manure, industry's waste, etc.) and vice versa, namely the biomass required to produce certain amount of electricity. This information will allow the Community to map its current status (e.g. available biomass) to its expectations.

ISABEL contribution: An on-line application tool will be developed and offered to the Community providing two options:

- **First Option:** estimation of the energy potential of given amount of biomass.
 - The Community will insert the following information for each of its members (breeders):
 - the number and type of breeding animals (e.g. Cattles);
 - the feedstock type they provide (Slurry liquid, Solid manure) for a given period of time;
 - the amount (tones) of energy crops that are willing/can afford to buy or cultivate (e.g. maize silage, cardoon silage, sorghum silage) on an annual basis; and
 - the amount of other organic waste that can use annually (e.g. dairy waste).
 - This information will be processed to estimate:
 - the energy potential of feedstock annually;
 - the estimated biogas electricity and thermal capacity of the potential biogas plant;
 - the estimated amount of digestate (organic fertilizer) produced; and
 - the adequacy of the provided feedstock mixture in terms of e.g. nitrates concentration
- **Second Option:** estimation of the amount and type of biomass needed for a certain amount of produced power. More specifically, the selection among a number of different values of biogas plant electrical and thermal capacity (e.g. 500KW, 1MW etc) will provide information on standard feedstock mixtures translated into e.g. number of cattle, amount of energy crop silage annually, energy crop cultivation area), etc.

This application tool will be freely available in ISABEL web-portal so that similar initiatives in Greece can use it. *Note: as the breeding methods differ in country (e.g. cattle breed and size, etc.) the calculations will be adjusted for biogas production in Greece.*

Action 3. Location of potential biogas plant (M3-M8)

The next question that Community needs to examine concerns the most suitable location for a potential NEOGAL community biogas plant. This location must hold all the adequate factors to secure the plant's operational and financial success.

ISABEL contribution: The project partners will analyse the availability and geographic distribution of the Community's feedstock and map the information on a digital map in order to suggest alternative locations for the biogas plant. The map will display:

- The regions characteristic, such as the transportation network, the terrain (rivers, lakes, mountains, etc.), historical sites and protective areas, cities and villages, etc.;
- The size and location of the Community members' farms and fields (e.g. the number and characteristics of breeding animals to estimate the amount of manure produced, etc.) to estimate their proximity to the transportation network and the available feedstock; and
- The Community's own fields as a potential locations for the plant; and

The members of the Community will provide the necessary data on their farms and fields as well as on possible installations to exploit the produced heat. Based on this data, the ISABEL partners will estimate a) the proximity of the feedstock to the transportation network; b) the available feedstock and energy/heat potential; and c) the proximity of the plant(s) to the electricity grid to suggest possible suitable locations for

building biogas plant(s). *(note: the analysis may reveal that more than one but smaller scale plants map better the Community's operation)*

It should be noted that the map will be developed as an off-line tool used by the ISABEL partners to offer the NEOGAL Energy Community information in the form of a detailed report. The aim is not to develop a tool that the Community will use by itself as this would require specific skills from its members. As the Community will grow and new members will be joining, the analysis will be repeated by the ISABEL partners taking into consideration the updated data. Finally, this exercise will act as a proof-of-concept for similar initiatives in other geographic locations and setting as the initial data will differ significantly (e.g. digital maps, available feedstock and its geographical distribution, etc).

Action 4. Analysis of the licensing procedures for a Biogas Plant operation (M6-M9)

The analysis and clarification of the legislation framework including the licensing and operational procedures for implementation of a biogas plant project is critical for the Community.

ISABEL contribution: A short report will be produced analysing the major steps and pre-conditions for installing a biogas plant, taking under consideration:

- the available incentive schemes foreseen under national legislation on Renewable Energy Sources for the construction of a biogas plant (e.g. Feed in Tariff scheme, Sliding Premium Scheme) depending on its installed power ("*Small*" < 500 kW, "*Large*" > 500 kW);
- the required licencing procedures depending on biogas plant characteristics (e.g. feedstock type); and
- the environmental and spatial requirements of biogas plant installation areas (e.g. distance from settlements or river banks).

The above report will be freely available in ISABEL portal as a valuable tool for every stakeholder interested in biogas plants in Greece. However, during the course of the project, this report will be revised to reflect any new laws and directives.

Action 5. Elaboration of a feasibility study for the Biogas Plant operation (M12-M18)

The elaboration of a feasibility study will provide assessments on alternative scenarios regarding Community's capacity to establish a Biogas Plant. These scenarios will clarify all the aspects that have to be taken into consideration for a successful potential Biogas Plant operation.

ISABEL contribution: Based on the analysis carried out on the previous steps, a detailed business plan will be developed outlining:

- the national biogas market and future potential;
- the spatial and technical characteristics of the biogas plant (e.g. alternative locations, installed power, etc.);
- the national legislative framework and licencing procedures and requirements;
- the construction and operational costs of potential biogas plant for specific power capacities and feedstock mixes depending on the size of the necessary biogas plant field, the infrastructure cost, the cost of necessary studies (e.g. environmental studies), etc. as well as a cost-benefit analysis;
- alternative funding sources (e.g. Bank loans, funding opportunities under the national "New Development" Law, Venture capitals, private investors, Structural Funds, etc.);
- alternative scenarios of expected economic performance in a period of 3-5 years; and
- a risk-benefits analysis.

The short report will form a template of basic guidelines that can be re-used by similar initiatives in Greece. The template will be freely available in ISABEL portal.

Action 6. Facilitate interaction among the members of the community (M3-M18)

There is a need to enhance the collaboration among the members of the Community to ensure transparency and wide acceptance of the Community's activities, while enable the exchange of ideas on its sustainable future.

ISABEL contribution: After discussion with the Community, a number of collaboration and communication tools (e.g. forum, social media, mobile applications etc) will be developed aiming to achieve fruitful exchange of ideas on biogas issues among the members of the Community.

Action 7. Stimulate the participation of relevant regional and national stakeholders (M11-M18)

NOEGAL Biogas Community will seek additionally the participation of relevant regional and national stakeholders aiming to enhance its potentiality to any biogas plant initiative decision taken in the future.

ISABEL contribution: In collaboration with the Community, ISABEL partners will exploit existed and potential networks to support and enhance their Community Energy initiative as well as promote the concept of Social Innovation in Europe. To do so, ISABEL partners will assist the NEOGAL Community to stimulate the involvement of a wide variety of stakeholders, such as:

- relevant biogas communities in Greece and in Europe;
- breeders which are not currently NEOGAL members;
- other cooperative dairy industries;
- public authorities at local/regional/national level; and
- citizens.

Indicative activities to be carried out include:

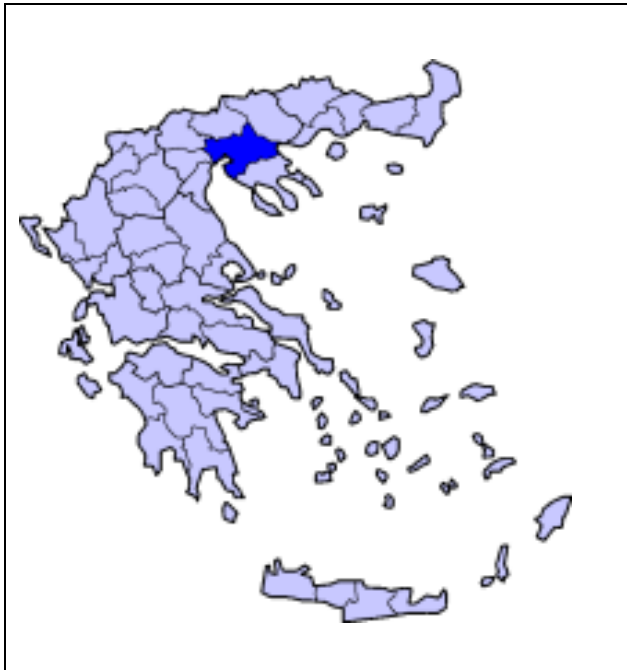
- face to face meetings with representatives of local stakeholders
- informative info-days/workshops with local stakeholders
- articles and interviews in local newspapers and radios presenting Biogas Community's activities, vision and strategy
- sending newsletters of Community's activities to targeted stakeholders
- exploitation of social media in advertising Community's presence and profile

3.2 “Leda Maria” Biogas Community Energy

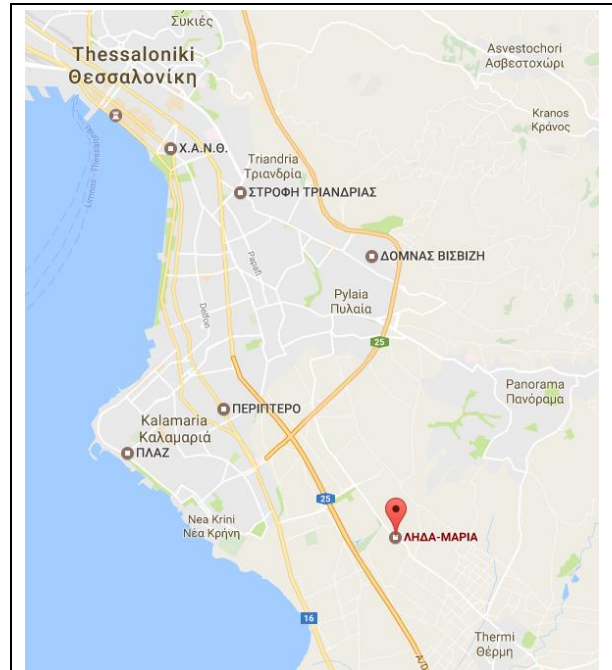
3.2.1 Description of the community

Leda Maria settlement is suburban area of Thermi Municipality, next to the urban agglomeration of Thessaloniki (Thessaloniki county). Offices and 150 families share the management of the communal area e.g. surveillance, maintenance of electrical infrastructure, gardening and household waste disposal.

A Community Administrative Council is annually elected and is responsible for the operation and management of Leda Maria settlement, while block of apartments administrators provide their collaboration to community's management and internal communication procedures. The Leda Maria inhabitants have a general meeting on a semester basis where all the aspects and plans are discussed and decisions are made.



Thessaloniki county
Region of Central Macedonia



Leda Maria settlement (urban agglomeration of Thessaloniki)

3.2.2 Community's Energy Vision and Strategy

The inhabitants of Leda Maria envision to become a row model in exploitation of local communities' potential in terms of safe, reliable, environmentally friendly and low cost energy supply to the settlement's inhabitants. To achieve their goal, they set the following objectives:

- To exploit their communal power and influence the use of Renewable Energy Sources by energy suppliers (promote the use of RES in their energy mix), while in parallel offer lower cost electricity to its inhabitants;
- To investigate an efficient and environmental friendly way for managing community organic waste and install a micro-scale biogas production unit; and
- To promote the concept of community energy attracting neighbouring settlements and stakeholders.

3.2.3 Community's Action Plan

The members of Administrative Council in collaboration with ISABEL partners agreed on a specific set of actions for the next period for the development of an Energy Community that will focus on a greener energy provision. In addition, they set a number of milestones to ensure the validity of their planning

within the overall socio-economic environment at both regional and national level. The regional ISABEL partners (Q-PLAN and EBW) will be supporting the implementation of this action plan and closely work with Leda Maria Community offering them the necessary expert advice. More specifically, the following actions were designed:

Action 1. Set up of Community Energy (M1-M2)

The members of the Administrative Council will inform all inhabitants on their intention to create an Energy Community and communicate its socio-economic, environmental and legislative aspects. More specifically, the aim is to:

- Activate those interested in joining forces and create the Community;
- Agree on a position paper outlining the Community's vision and strategy;
- Agree on the Community's organisational principles and key actors that will act as information hubs collecting the necessary information and ensure that this information is shared among the members of the Community to jointly take actions; and
- Confirm the list of actions to be followed during the next period for the effective realisation of its vision.

ISABEL contribution: ISABEL partners will actively be involved in the discussions and share their knowledge from similar initiatives.

Action 2. Selection of 'greener' energy provider (M2-M5)

The first goal of the Community is to negotiate a new contract with energy providers based on two key factors:

- the share of RES in their energy production mix compared to traditional energy sources; and
- their pricing policy.

ISABEL contribution: The ISABEL partners will support the Community to collect the Community's energy needs (e.g. KWh on annual basis) and analyse the offers received from the various energy providers in order to suggest the most suitable option(s).

The knowledge gained will form the base for similar initiatives in Greece promoting the use of RES, while it will be used as an argument to engage neighbouring settlements to this effort and enhance the Community's negotiation position against energy providers.

Action 3. Scenarios for management of Leda Maria settlement's organic waste – micro-scale biogas unit (M3-M18)

The Community is eager to find solutions for managing its organic waste in an efficient and environmental way. To do so, they are interested in installing a micro-scale biogas unit to also cover their common electricity needs (e.g. surveillance, street lighting, etc.) and compost for gardening. In close collaboration with the ISABEL partners have agreed on the following actions:

Action 3.1 - Dimensioning of potential Micro scale Biogas Community Production Unit (M4-M7)

The question the Community needs first to estimate is the potential power capacity of the Micro scale Biogas unit based on the available Community biomass (e.g. food waste, plant residues etc.).

ISABEL contribution: ISABEL partners will support the Community to collect data on the available feedstock, namely the amount and characteristics of organic waste (e.g. vegetables, meat, oil, fat, etc.) and analyse their power potential. In parallel, a survey on biogas micro-scale units will be carried out both in terms technical characteristics and implementation costs, resulting to the most suitable options for Leda Maria settlement. A short report will be prepared summarising the findings of the analysis in order to support the decision making process of the Community.

Action 3.2 - Analysis of licensing procedures for a potential Micro scale Biogas Production Unit (M7-M9)

The analysis and clarification of the licensing procedures in the implementation of a micro-scale biogas unit is critical for the Community's planning.

ISABEL contribution: A short report will be produced analysing the major steps and pre-conditions for installing a biogas plant, taking under consideration:

- the available incentive schemes foreseen under national legislation on Renewable Energy Sources for the construction of a micro-scale biogas unit;
- the legislative limitations on the self-management of a settlement's organic waste;
- the power capacity of the potential micro scale biogas production unit;
- the licensing procedures depending on micro scale biogas production unit characteristics (e.g. feedstock type, installation areas requirements)
- the environmental and spatial requirements of a micro-scale biogas unit installation (e.g. distance from the settlement, safety conditions, etc.)

The above report will be freely available in ISABEL portal acting as guide for similar installations in Greece. However, during the course of the project, this report will be revised to reflect any new laws and directives

Action 3.3 - Feasibility study of the potential Micro scale Biogas Community Production Unit (M9-M18)

The elaboration of a feasibility study will provide assessments on alternative scenarios regarding Community's capacity to establish a micro-scale biogas unit. These scenarios will clarify all the aspects that have to be taken under consideration for a successful potential Biogas Unit operation.

ISABEL contribution: A short report displaying the results of the feasibility study (Business Plan). This report will mainly include the following sessions:

- the spatial and technical characteristics of the biogas plant (e.g. alternative locations, installed power, etc.);
- the national legislative framework and licencing procedures and requirements;
- the construction and operational costs of potential biogas plant for specific power capacities and feedstock mixes depending on the size of the necessary biogas plant field, the infrastructure cost, the cost of necessary studies (e.g. environmental studies), etc. as well as a cost-benefit analysis;
- alternative funding sources (e.g. Bank loans, funding opportunities under the national "New Development" Law, Venture capitals, private investors, Structural Funds, etc.);
- alternative scenarios of expected economic performance in a period of 3-5 years; and

The short report will form a template of basic guidelines that can be re-used by similar initiatives in Greece. The template will be freely available in ISABEL portal.

Action 3.4 Investigation of collaboration potential with neighbouring settlements for urban waste management (M5-M18)

It is crucial for Leda Maria Biogas Community Energy to develop collaborations with neighbouring settlements that will make any Micro scale Biogas Unit project more feasible, in terms of exploitation of biogas and electricity production.

ISABEL contribution: Leda Maria with the support of ISABEL will exploit any reports and studies have already made aiming in persuading neighbouring settlements to collaborate in urban waste management.

Action 4. Collaboration with neighbouring American Farm School for the development of a potential biogas plant (M3-M18)

Leda Maria Community will investigate collaboration with the neighbouring American Farm School (<http://www.afs.edu.gr>) in the development of a potential biogas unit that could cover a significant part of both communities heating needs (construction of a district heating grid) in addition to electricity production.

Note: The American Farm School is the premier institution in southeastern Europe for education and research in agriculture, food systems, environmental studies and other life sciences related to our sustainable future. Founded in 1904 by enlightened American educators, the School continues to apply its hallmark "learn by doing" approach to educate students of all ages. Divisions include the Elementary School of Environmental Education, a High School, and the Perrotis College of Agriculture, Environment and Life Sciences. The School has its own farm (cows, turkeys, poultry) while it collaborates with other neighbouring farms to produce a wide range of dairy products and owns thus serving as a living laboratory for hands-on education and applied research.

An set of actions was agreed similar to the case of the NEOGAL Energy Community. More specifically:

Action 4.1. Dimensioning of potential biogas unit/plant (M3-M7)

Estimation of the potential power capacity of the biogas plant based on the available biomass (e.g. manure, poultry waste, etc.).

ISABEL contribution: An on-line application tool will be developed to estimate the electricity and heat potential of the plant taking into consideration:

- the available feedstock (amount of manure, poultry residues) and its characteristics (solid or liquid);
- the available area in Farm School where the biogas plant can be build; and
- the amount of biogas that can be provided from a potential Leda Maria Community Micro scale Biogas Production Unit

This application tool will be freely available in ISABEL web-portal so that similar initiatives in Greece can use it.

Action 4.2. Analysis of licensing procedures for a potential biogas unit/plant (M7-M9)

The analysis and clarification of the legislation framework, including the licensing and operational procedures for the implementation of a Biogas unit/plant project.

ISABEL contribution: A short report will be conducted containing and describing all the laws and directives that concern the stages to the final installation of a biogas unit/plant, taking under consideration:

- the available incentive schemes foreseen under national legislation on Renewable Energy Sources for the construction of a biogas plant (e.g. Feed in Tariff scheme, Sliding Premium Scheme) depending on its installed power (*note: from the data already collected it is most probable that such unit will be "small" < 500 kW*);

- the required licensing procedures depending on biogas unit/plant characteristics (e.g. feedstock type); and
- the environmental and spatial requirements of biogas unit/plant installation areas (e.g. distance from Farm School buildings).

The above report will be freely available in ISABEL portal where every interested stakeholder can be informed and use it as a tool in a potential biogas initiative.

Action 4.3. Feasibility study of the potential biogas unit/plant (M9-M18)

The elaboration of a feasibility study will provide assessments on alternative scenarios regarding Community's capacity to establish a Biogas Unit/Plant in collaboration with Farm School. These scenarios will clarify all the aspects that have to be taken under consideration for a successful potential Biogas Unit/Plant operation.

ISABEL contribution: Based on the analysis carried out on the previous steps, a detailed business plan will be developed outlining:

- the spatial and technical characteristics of the biogas plant (e.g. alternative locations, installed power, etc.);
- the national legislative framework and licencing procedures and requirements;
- the construction and operational costs of potential biogas plant for specific power capacities and feedstock mixtures as well as the infrastructure costs, the cost of necessary studies (e.g. environmental studies), the construction cost of a district heating grid among the two collaborative communities (Leda Maria, Farm School), etc.;
- alternative funding sources (e.g. Bank loans, funding opportunities under the national "New Development" Law, Venture capitals, private investors, Structural Funds, etc.);
- alternative scenarios of expected economic performance in a period of 3-5 years; and
- a risk-benefits analysis.

The short report will form a template of basic guidelines that can be re-used by similar initiatives in Greece. The template will be freely available in ISABEL portal.

The report will be an example for Greek ISABEL partners to implement similar studies for future Biogas Communities under ISABEL project.

Action 5. Facilitate interaction among the members of the Community (M3-M18)

The members of the Community will need to establish an efficient way of communication among them concerning exchange of ideas on biogas community energy issues. This operation is critical to the mutual decisions that have to be taken on the selection of a green energy provider as well as on the implementation of a biogas unit/plant initiative.

ISABEL contribution: Exploitation of Leda Maria's current internal communication methods (e.g. face to face interactions, mail and e-mail correspondence) to facilitate the exchange of ideas concerning the establishment of Biogas Community Energy Initiative. Additionally, after discussion with the Community, a number of other collaboration and communication tools (e.g. forum, mobile applications, social media etc) will be developed to facilitate communication among the members of the Community.

Action 6. Stimulate the participation of relevant regional and national stakeholders (M15-M18)

Leda Maria Biogas Community Energy will aim additionally at the participation of regional and national stakeholders in order to enhance its potentiality to any community energy decision taken in the future (green energy providers, biogas unit/plant).

ISABEL contribution: In collaboration with the Community, ISABEL partners will exploit existed and potential networks with regional and national communities, authorities and relevant stakeholders in designing an upscaling and enlargement activities plan report targeting:

- neighbouring settlements and communities (e.g. schools and technological parks, malls)
- public authorities at local/regional/national level
- citizens
- any other stakeholder that could be an asset for Leda Maria biogas community

Indicative activities to be carried out include:

- face to face meetings with representatives of local stakeholders
- informative info-days/workshops with local stakeholders
- articles and interviews in local newspapers and radios presenting Community's activities, vision and strategy
- sending newsletters of Community's activities to targeted stakeholders
 - exploitation of social media in advertising Community's presence and profile

This report will be part of Biogas SI Platform and Communities general upscaling and enlargement activities plan.

3.3 “Prespa” Biogas Community

3.3.1 *Description of the Community*

The area of Prespa is shared by three countries, Greece, Albania and FYROM, and the Greek part is located in Western Macedonia. The area refers to the two lakes, ‘Mikri Prespa’ and ‘Megali Prespa’, as well as their wider lake basin which extends to the tops of the mountains which surround them. The special ecological value of the area and the fact that it is shared with Albania and FYROM led to the establishment of the Transboundary Prespa Park with the aim to achieve the total and effective protection of the area’s shared natural and cultural values with the participation of its inhabitants. The **Transboundary Prespa Park** was founded on 2nd February 2000, World Wetlands Day, with a joint declaration by the Prime Ministers of the three countries that share the area of the park.

The broader area is protected under national and international laws. More specifically:

- In 1974 the Greek state declared almost all of Greek Prespa to be a National Park,
- In 1975 the area was also declared a ‘Landscape of Outstanding Natural Beauty.’
- In 1974 the Lake ‘Mikri Prespa’ was also included in the 10 Greek wetlands which were characterised as being of International Importance, coming thus under the aegis of the international Ramsar Convention.
- A large part of the Prespa National Park is included in the NATURA 2000 network of protected areas

There are two main bodies responsible for the protection of the broader area:

- The **Prespa National Park Management Body** (<http://www.fdedp.gr>), based in the village of Agios Germanos, was established by the Greek state in July 2003 aiming to contribute to the management of the protected area and to safeguard the valuable natural features of the National Park.
- The **Society for the Protection of Prespa Area** (<http://www.spp.gr>) was formed in 1991 to systematically and effectively contribute to the protection of natural and cultural heritage throughout the entire Prespa basin, by means of a wide range of projects jointly promoting viable development and the harmonious co-existence of man and nature.

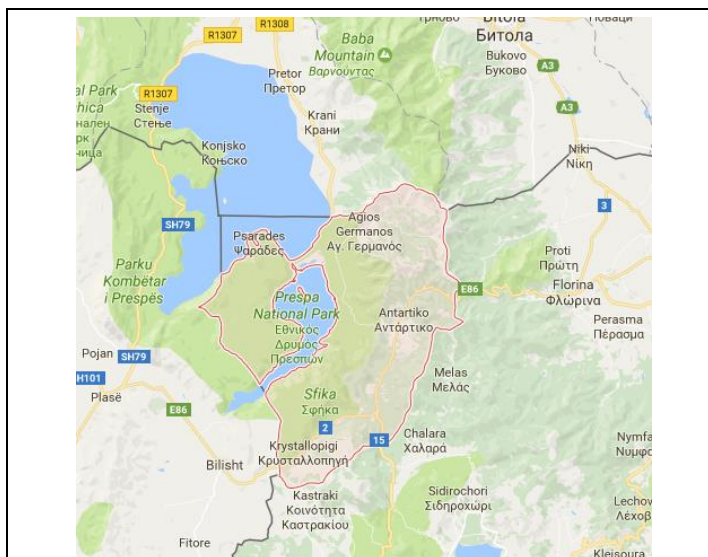
The main economic activities in the region are fishing, agriculture, livestock and tourism, with the two lakes constituting the centre of these activities. The main problem the area is facing regards water quality degradation due to nutrient pollution (eutrophication), which is the result of agricultural and livestock activity in the area around the lakes. Farmers use fertilizers to their fields which are drained in the lakes, while the manure, that comes from cows bred in the area, pollutes the soils and eventually the lakes.

The Biogas community will consist of

- the Society for the Protection of Prespa,
- the Management Body of Prespa National Park,
- the members of the Livestock association of Municipality of Prespa,
- the Municipality of Prespa,
- the Agricultural Cooperative of Bean Producers "PELICAN" (<http://www.prespabeans.gr/>)



Florina county
Region of Western Macedonia



Prespes area
(North West Greece – borders with Albania and FYROM)

3.3.2 Community's Vision and Strategy

The two bodies responsible for the protection of the Prespa Park share a common vision: to improve the inhabitants' standard of living, through the sustainable development and protection of the area, and the promotion of cooperation between the three countries which share Prespa. They recognize the critical state of the fragile and vulnerable ecosystem and therefore stimulate the involvement the region's inhabitants to ensure the long-term sustainable use of the region's natural resources, while also preserve the ecosystem integrity for current and future generations.

To achieve their vision, among other actions they plan and implement, they set as a priority to investigate the potentiality of building a biogas plant in close collaboration with the Livestock association of Municipality of Prespa. Their aim is to use as feedstock a mixture of the manure from the livestock, crops' waste and the reeds from the lake (note: each year the reeds are cut and disposed as waste). Such plant will bring multiple benefits to the region:

- It will act as an additional source of income to the involved stakeholders;
- Will be a legal and profitable solution to their environmental issues as far as it concerns the proper and sustainable management of the manure
- The thermal energy that will be produced will be used either to a district heating system for houses or municipal buildings in the area or in a productive process (cannery, green house , etc.);
- The dig estate that will be produced by the potential biogas plant will be a perfect organic fertilizer to their farms that will not contain any nitrates that pollute the lakes.

3.3.3 Community's Action Plan

The members of the board of the Society for the Protection of Prespa Area and the Agricultural Cooperative of Bean Producers "PELICAN" area formed a core team responsible for the investigation of the potentiality to build a biogas plant. This core team will act as the **Prespa Biogas Community's** leaders in collaboration with ISABEL partners agreed on a specific set of actions for the next period to collect further information on the potentiality of building a biogas plan. In addition, they set a number of milestones to ensure that the validity of their planning within the overall socio-economic environment at both regional and national level. The regional ISABEL partners (Q-PLAN and EBW) will be supporting the implementation of this action plan and closely work with the Prespa area biogas community bodies offering them the necessary input and tools. More specifically, the following actions were designed:

Action 1. Set up of Biogas Community (M1-M3)

The core team of the Community will inform all the region's breeders and farmers as well as any other interested stakeholders (e.g. local authorities, associations and clusters) on their intention to create a Biogas Community and communicate its socio-economic, environmental and legislative aspects. A Community's inauguration event will be organised in order to:

- Identify the initial members of the community;
- Help realize synergies for meeting the needs of all supply chain actors;
- Agree on a position paper outlining the Community's vision and strategy;
- Agree on the Community's organisational principles and key actors that will act as information hubs collecting the necessary information for the feasibility study and the business plan of the biogas plant and ensuring that this information is shared among the members of the Community to jointly take actions; and
- Confirm the list of actions to be followed during the next period for the effective realisation of its vision.

ISABEL contribution: ISABEL partners will actively be involved in the discussions and share their knowledge on the operation procedures from similar initiatives as well as support the preparation of the Community's position paper.

Action 2. Dimensioning of potential biogas plant (M4-M7)

Investigate the potential power capacity of the biogas plant based on the available biomass (e.g. manure, reeds, etc.) and vice versa, namely the biomass required to produce certain amount of electricity. This information will allow the Community to map its current status (e.g. available biomass) to its expectations.

ISABEL contribution: An on-line application tool will be developed and offered to the Community providing an estimation of the energy potential of certain amount of biomass.

- The Community will insert the following information for each of its members (breeders, farmers):
 - the number and type of breeding animals (e.g. Cattles, pigs);
 - the feedstock type they provide (manure) and the period of time that they can provide it ;
 - the amount (tones) of energy crops that are willing/can afford to buy or cultivate (e.g. maize silage, cardoon silage, sorghum silage) on an annual basis; and
 - the amount of reed cut every year and the period of time that they will be cut.
- This information will be processed to estimate:
 - the energy potential of feedstock annually;
 - the estimated biogas electricity and thermal capacity of the potential biogas plant;
 - the estimated amount of digestate (organic fertilizer) produced; and

This application tool will be freely available in ISABEL web-portal so that similar initiatives in Greece can use it.

Action 3. Location of potential biogas plant (M4-M9)

The next question that Community needs to examine concerns the most suitable location for a potential biogas plant. This location must address all the adequate factors to secure the plant's operational and financial success in-line with the national legislation (e.g. environmental protection of the Prespa area).

ISABEL contribution: The project partners will analyse the availability and geographic distribution of the Community's feedstock and map the information on a digital map in order to suggest alternative locations for the biogas plant. The map will display:

- The regions characteristic, such as the transportation network, the terrain (rivers, lakes, mountains, etc.), historical sites and protective areas, cities and villages, etc.;
- The size and location of the Community members' farms and fields (e.g. the number and characteristics of breeding animals to estimate the amount of manure produced, etc.) to estimate their proximity to the transportation network and the available feedstock; and
- The Municipality's own fields that could be disposed as potential locations for the plant; and

Also the ISABEL team will get available data from all 5 stakeholders. The data will be on agricultural by-products potentials and the spatial description of agricultural by-products potentials that means of the quantity of reeds being cut during a year, data of the quantity and quality of manure in the area, the geographical location of livestock, the geographical location of reeds, etc. The quality of reeds will be tested for anaerobic digestion experiments in a laboratory.

The members of the Livestock association of Municipality of Prespa and the Agricultural Cooperative of Bean Producers "PELICAN" will provide the necessary data on their farms and fields. The Society for the Protection of Prespa and the Agricultural Cooperative of Bean Producers "PELICAN" have participated in a numerous of LIFE projects and have at its disposal data about the quantity and quality of reeds being cut in a year, the location in the lake where they come from etc.

The ISABEL team will develop scenarios for different suitable supply chain management and co-ordination issues. In this stage it is crucial to inform and communicate with all potential feedstock providers that one of the most important factors for the success of each biogas community project will be the high security for the supply of the agricultural by-products. It is essential to communicate that the feedstock has to be secured.

Based on this data, the ISABEL partners will estimate a) the proximity of the feedstock to the transportation network; b) the available feedstock and energy/heat potential; and c) the proximity of the plant(s) to the electricity grid to suggest possible suitable locations for building biogas plant(s). *(note: the analysis may reveal that more than one but smaller scale plants map better the Community's operation)*

It should be noted that the map will be developed as an off-line tool used by the ISABEL partners to offer the Prespa Energy Community information in the form of a detailed report. The aim is not to develop a tool that the Community will use by itself as this would require specific skills from its members. As the Community will grow and new members will be joining, the analysis will be repeated by the ISABEL partners taking into consideration the updated data. Finally, this exercise will act as a proof-of-concept for similar initiatives in other geographic locations and setting as the initial data will differ significantly (e.g. digital maps, available feedstock and its geographical distribution, etc).

Action 4. Analysis of the licensing procedures for a Biogas Plant operation (M8-M9)

The analysis and clarification of the legislation framework including the licensing and operational procedures for implementation of a biogas plant project is critical for the Community.

ISABEL contribution: A short report will be produced analysing the major steps and pre-conditions for installing a biogas plant, taking under consideration:

- the available incentive schemes foreseen under national legislation on Renewable Energy Sources for the construction of a biogas plant (e.g. Feed in Tariff scheme, Sliding Premium Scheme) depending on its installed power ("*Small*" < 500 kW, "*Large*" > 500 kW);
- the required licencing procedures depending on biogas plant characteristics (e.g. feedstock type); and
- the environmental and spatial requirements of biogas plant installation areas (e.g. distance from settlements or river banks and lakes).

The above report will be freely available in ISABEL portal as a valuable tool for every stakeholder interested in biogas plants in Greece. However, during the course of the project, this report will be revised to reflect any new laws and directives.

Action 5. Elaboration of a feasibility study for the Biogas Plant operation (M12-M18)

The elaboration of a feasibility study will provide assessments on alternative scenarios regarding Community's capacity to establish a Biogas Plant. These scenarios will clarify all the aspects that have to be taken into consideration for a successful potential Biogas Plant operation.

ISABEL contribution: The ISABEL team will develop a preliminary feasibility study (technical feasibility). It will be based on available data that they will get from the 5 bodies.

Based on the analysis carried out on the previous steps, a business plan will be developed outlining:

- the spatial and technical characteristics of the biogas plant (e.g. alternative locations, installed power, etc.);
- the national legislative framework and licencing procedures and requirements;
- the construction and operational costs of potential biogas plant for specific power capacities and feedstock mixes depending on the size of the necessary biogas plant field, the infrastructure cost, the cost of necessary studies (e.g. environmental studies), etc. as well as a cost-benefit analysis;
- alternative scenarios of expected economic performance in a period of 10-20 years; and

The short report will form a template of basic guidelines that can be re-used by similar initiatives in Greece. The template will be freely available in ISABEL portal.

The business plan will be based on :

- actual market prices for the selected technical solution equipment
- actual market cost for constructing the potential biogas plant (including the land cost, or potential district heating grid, or other infrastructure works)
- actual market prices for the operational cost
- actual market prices for the connection cost to the electricity grid (grid operator)
- real rates of economic benefit from the sale of the electricity
- scenarios for the economic benefit from the exploitation of thermal energy produced
- scenarios for the economic benefit from the exploitation of the dig estate produced
- a risk-benefits analysis.

Then a preliminary financing feasibility study will be developed based on scenarios of :

- bank loan
- TPF from private investor
- self financing
- Developmental law
- Other financing opportunities

Action 6. Facilitate interaction among the members of the community (M3-M18)

There is a need to enhance the collaboration among the members of the Community to ensure transparency and wide acceptance of the Community's activities, while enable the exchange of ideas on its sustainable future.

ISABEL contribution: After discussion with the Community, a number of collaboration and communication tools (e.g. forum, social media, mobile applications etc) will be developed aiming to achieve fruitful exchange of ideas on biogas issues among the members of the Community.

Action 7. Stimulate the participation of relevant regional and national stakeholders (M11-M18)

Prespa Biogas Community will seek additionally the participation of relevant regional and national stakeholders aiming to enhance its potentiality to any biogas plant initiative decision taken in the future.

ISABEL contribution: In collaboration with the Community, ISABEL partners will exploit existed and potential networks to support and enhance their Community Energy initiative as well as promote the concept of Social Innovation in Europe. To do so, ISABEL partners will assist the Community to stimulate the involvement of a wide variety of stakeholders, such as:

- relevant biogas communities in Greece and in Europe;
- other cooperative dairy industries;
- public authorities at local/regional/national level; and
- citizens.

Indicative activities to be carried out include:

- face to face meetings with representatives of local stakeholders
- informative info-days/workshops with local stakeholders
- articles and interviews in local newspapers and radios presenting Biogas Community's activities, vision and strategy
- sending newsletters of Community's activities to targeted stakeholders
- exploitation of social media in advertising Community's presence and profile

4. Biogas Communities in UK

4.1 “Hockerton” Community

4.1.1 Description of the Community

The core of the emerging biogas community is Hockerton, a village and civil parish at the border between Lincolnshire and Nottinghamshire. There are 60 households and a population of 150 inhabitants.



The initial stakeholders and entry point for ISABEL have been the Hockerton Housing Project and Sustainable Hockerton. These are the key stakeholders, as they have already experience with community energy projects, and a network of contacts with other local key actors.

Hockerton Housing Project is a community business and a self-sufficient co-housing development. They built one of the first examples in the UK of earth sheltered, self-sufficient ecological housing development, with reduced heating requirements, local food production (vegetable gardens, polytunnels, aquaponics) and wastewater treatment. They also run a not-for-profit co-operative which hosts tours and courses for all ages, and provides consultancy services to help others deliver sustainability at home, community or workplace levels.

Sustainable Hockerton is an Industrial and Provident Society (IPS) formed by a group of Hockerton residents in 2009. The aim of Sustainable Hockerton is to make Hockerton a more sustainable village and reduce the amount of carbon released into the atmosphere. The Society has installed a 225 kW wind turbine and 87 kW solar PV, which generates income from feed in tariffs. Any financial surplus is distributed to the parish to promote sustainable development projects (such as building retrofits and other efficiency measures).

To date engagement with the Hockerton housing project has been with the intent of integrating biogas into both the village and housing project. The community have awareness of sustainable renewable energy. Also are aware that biogas offers a new additional dimension to the renewable energy mix, while offering the opportunity to reduce the communities environmental footprint by actively managing organic waste stream currently generated by the households. Therefore the community are interested exploring the multiple benefits that waste management supported by anaerobic digestion can have above and beyond the yield of a gas vector.

The volume of the waste generated clearly suggests that any biogas installation, at least initially, will be a microscale. However during the scoping phase it is entirely conceivable that other surrounding villages could be encouraged to partner up and therefore increase the scale of the operation.

At the micro-scale (e.g. less than 1000 ton/year waste processed and 10 kWh/year of potential electricity produced) the main direct financial returns will come from digestate valorisation and increased food

production distributed and sold to the nearby communities. The community already sells eggs as part of its business model and so this would be a natural extension of their activities. At bigger scales (e.g. using the agro-wastes and manure from farms), potential revenues from energy, such as biomethane bottling scheme, might become relevant.

4.1.2 Community's Vision and Strategy

The Hockerton housing project and the villagers have a clear vision of the need to transition towards true sustainability thereby reduce the collective environmental footprint and related carbon emissions as evidenced by the current activities.

The ambition of extending their current activities and moving closer to a 'closed loop' has been the topic of the two meetings/workshops to date.

Therefore while the Hockerton community is aware to biogas, working the UK ISABEL team, it is planned to hold further meetings where the ambition of the community can be aligned with the potential benefits of biogas. In this context the community can perhaps be seen as in an "opening up" phase, where different pathways are being explored by the different actors of the community.

Although the community's vision with respect to the adoption of biogas as a route to achieve waste management has yet to be finalised the previous meeting have created ideas and 'food for thought' among the community, for example some of the visions that emerged during the aforementioned workshop are:

- A biomethane bottling scheme, operating between the farm and the village users (who at the moment have not access to the natural gas grid and rely on LPG for cooking)
- A community polytunnel growing scheme, producing food for the community and energetically independent.
- The installation of a micro-biogas plant operated by the local pub.

Clearly given the stage in the evolution of the community's 'thinking' there is the potential for the UK ISABEL team to assist through co design workshops etc. to tease out the strategies which the community can align with. To achieve the goal there are number of steps which need to be undertaken to derive the data that will support the community achieve a consensus.

For example;

- The potential sources of wastes such as food waste, garden wastes from household and commercial activities, together with manure and agricultural wastes from the local farms need to be quantified, both in the Hockerton community but also the surrounding villages which may enable increase in the scale of the installation. At the moment, no quantitative estimation of the available waste is available, as this depends mainly on the geographical boundary of the biogas community, and the sources of waste considered. Mapping of the assets, commercial activities and available waste will be one of the first activities of the action plan for the Hockerton community. Dimensions of the biogas systems therefore are still not fixed and will depend mainly on the amount of waste and business and organizational model that will emerge.
- Given it is acknowledged that digestate utilisation will not only close the waste management loop and also provide a source of added value, it is important to conduct a very preliminary assessment of the opportunities that may align with the community's emerging vision.

4.1.3 *Community's Action Plan*

The Hockerton community has been engaged to date via two meeting/workshops and have moved from 'partial' unawareness to awareness. Working closely with the community the UK ISABEL team plan and execute the following actions

(M1-M3) further engagement with stakeholders: As stated to date two meeting-workshops have been held with very positive out comes. However there is a need to continue the engagement to further raise awareness within the catchment area through the following channels;

- **Direct contacts:**
 - It is acknowledged that any community is made up of individuals which adopt either conscious and unconsciously the role of influencers, promoters, gatekeepers, leaders, experts. Therefore the goal is work to continue to understand the social- political landscape of the community and there by identify opinion formers and earlier adopters so as to provide a conduit back to the community.
- **Strengthening community;**
 - The use of social events in local public houses has been demonstrated as an extremely successful route of creating community spirit and 'buy in' to community energy project as illustrated in Aston Hayes project. Therefore working with landlord of the central Hockerton public house the UK ISABEL team to create a vibrant community willing to commit to the vision
- **Explore collaboration with nearby villages**
 - Hockerton village is in a rural setting and there are a number of villages in vicinity. Therefore it is planned to contact the parish councillors to open a line of engagement referencing the activity in Hockerton.
 - Engaging additional local communities if successful, could lead to installing a biogas unit with greater capacity which would the therefore enhance the economics of the community energy proposition.

(M1-M3) creation of a local team/steering group

- As has been stated it is recognised that 'champions' will emerge from within the community and will become the principle actors.
- Therefore to foster the ambition and emerging vision a steering committee will be created and formal structure for decision making established and ratified.
- The local steering committee which will include a member of the UK ISABEL team will forge a structured working relationship.

(M1-M4) mapping of assets and resources in the community

- As stated there is a need to develop a clear understanding of the community assets in terms of availability of organic material, potential sources of labour, markets for local food products, options for installing biogas unit etc.
- To conduct the local 'audit' a variety of approaches will be used. For example structure interview, online surveys, and direct canvassing of the community.

(M2-M4) workshops to develop theory of change-participative

- A series of workshops will be arranged with the Hockerton community, with view of bringing all parties together to begin so as to 'crystallise' the vision and associated strategies to develop a SI driven biogas project.
- With financial support from the ISABEL team generated via sponsorship a whole day will be allocated to allow full 'buy in' and realisation of the vision through an active participatory engagement.

(M3-M5) co-design workshop: "initial evaluation phase"

- Having conducted a series of Participatory workshops aimed at developing and strengthening the communities vision the next phase is to transition into evaluation phase (Ref D1.4)
- To assist the transition to initial evaluation phase a series of co-design workshops will be held where the ambitions and goals are further refined developing clear definitions as to expect output.
- A key component of the Participatory evaluation establishing types and value of costs and benefits perceived by the community

(M5-M8) refining the scenarios: (consolidation of evaluation phase)

- In order to support the community to undertake a thorough evaluation of the potential of a SI driven biogas project the ISABEL partners will support comprehensive feasibility study covering the following elements;
- **Assessment of biogas technologies**, covering feed stock management, gas production, gas clean up, gas storage/distribution and post production digestate management
- **Product-Evaluation of the type and configuration**; gas type 'crude biogas' or refined biomethane. Routes to add value to digestate. While energy generation is the clear goal of the proposed project there are a number of opportunities where the appropriate waste management enable extraction/recovery of additional value. Therefore there will be attempt to define the range of potential products their specification and the required infrastructure required to realise the potential.
- **Marketing-assess the route to market for new and existing products**; The objective will be to assess/evaluate and explain the creation of new or 'me-to' products and or services. At the same time develop a Product Marketing Plan Methodology to provide a high level description of how the organization will market its product or service.
- **Market Research- assess market and corresponding strategy**; While distinct the work does integrate with the marketing section. The objective is to develop a clear understanding of the current market, value, volume locally and regionally. At the same time establish where possible any Unique Selling Position (USP), i.e. opportunities to differentiate a position within the market.
- **Financial/Economic-assess overall potential viability**; Financial projections are central to any new project selection. The objective is to provide a description of the financial projections the new initiative is expected to yield versus estimated costs. The work will also derive key the assumptions on which the illustrated financial projections are based.
- **Evaluate Legal Requirements and Tax Obligations**; The objective is assess all legal and financial obligations. Thereby enable the planned organisation to comply with certification where appropriate, for example PAS110 regulations with regards to food waste management and associated digestate.
- **Assess Social, Environmental, Sustainability impact** Apart from the financial criteria any project evaluation must also include social and environmental aspects in order to address the three cornerstones of sustainability. Therefore the social and environmental impact will be assessed and output used to assist the design of an organisational/managerial structure.
- **Organizational/Managerial Feasibility**; The objective is to describe and optimise a business organisation that would facilitate efficient operation of the business model.
- **Operational- assess the resource requirement and management**; Evaluate how to take advantage of the opportunities identified. Specifically the labour and infrastructural requirements will be assessed and described. It is not intended to include a detailed schedule as this would be developed during project planning. However the objective is to provide milestones and time frames for completion as a guideline only.

(M8-M10) "Transition to adoption phase" workshops: selection of "ideal" biogas community

- The feasibility study executed during M5-M8 provides the foundation about which a business model will be formulated that aligns with the communities vision

- During the adoption phase the ISABEL partners will support the community to develop a comprehensive business plan that incorporates the foundation provided by the feasibility study and builds on the business models articulated as outputs of the co-design workshops.
- In addition to the business plan a management/operational plan will be prepared a first draft and used to underpin the transition into the implementation phase.

(>M10): Implementation phase.

- Moving from adoption to implementation the ISABEL partners will support the preparation of a detailed project plan which will cover all the operational, financial and legal components and the associated task will be clearly articulated and scheduled.
- The community will produce a full project plan to support the business plan which will be the main instrument whereby finance will be raised for the project.
 - The route whereby funds are raised will be illustrated in the business plan, particularly if the community itself become a major share holders

4.1.4 ISABEL Support Services in Action Plan implementation

The ISABEL partners will actively support the Hockerton community throughout the evolution of the project. The support services provided by the ISABEL team to the Hockerton community will reflect the distinct phases the project is expected to transition through and are summaries as follows;

Unawareness-Awareness Phase

- As stated the ISABEL team will continue to foster engagement by lobbying/canvassing the 'greater Hockerton community but also the surrounding villages.
- Further Participatory and co-design workshops will be arranged and delivered by the ISABEL team where Participatory theory of change support Hockerton community transition from awareness to the evaluation phase.
- The UK team have discussed the importance of develop an interactive Digital platform. The web portal will become a repository for the information generated within the workshop and in the initial stages foster learning, communication, sharing across communities, connection with other actors, through the provision of social media tools such as blogs, forum etc..

Evaluation Phase

- In the early stages of Evaluation phase the ISABEL partners will provides tools and methodologies which support scenario building, road mapping, backcasting etc.
- The ISABEL team will provide links and connection with expert knowledge, professional network: and support national/international conferences which will be designed to further the communities understanding of the practicality of the developing biogas based community energy projects
- The ISABEL team will provide the structure and support required to develop a comprehensive Feasibility studies: develop main indicators across various realms. Techno-economic, social and environmental.
- Where possible the ISABEL team will support practical evaluation of the types of biogas technologies operating successfully at the desired scale.

Adoption phase

- The ISABEL team will assist the structuring and development of the business plan, through workshops that offer the 'generic tool kit' that supports the development of business plan fir for purpose and integrating the feasibility study and associated business models.
- The ISABEL team will offer support and guidance where appropriate to allow the community to select the optimal finance model.

Implementation phase

- The ISABEL team will support the development of both a project plan and management plan which will provide the framework whereby the desired project configuration will be implemented
- Access to funding; depending on the financial model adopted the ISABEL team will provide guidance and support to raise the required funds e.g. – crowdfunding – prepare offer for community shares
- Access to technology providers, the ISABEL team will through its network be able to provide access to the chosen technology.

4.2 “Lincoln” Community

4.2.1 *Description of the Community*

ISABEL has started a collaboration with various organizations active in Lincoln that are responsible for the development of a new food strategy for Lincoln and the wider rural hinterland. A report was published in October 2016, which describes the main aspects of the food strategy. The main stakeholders responsible for the strategy are:

- East Midlands Regional Big Food Project Board
- Public Health England, East Midlands
- City of Lincoln Council
- Lincolnshire County Council
- Rural Community Council (RCC)
- Community Lincs, a charity active developing community projects
- Peakhill Associates, renewable energy consultants
- United Lincolnshire Health Trusts
- University of Lincoln

The initial core of the food strategy and collaboration with ISABEL will be the regeneration of the covered market, a market hall located centrally in Lincoln old town. The regeneration aims to make the market a hub for wider community engagement, showcasing closed loop approaches to food production enabled by anaerobic digestion of biowastes. It is part of the engagement strategy to include other actors, such as existing market traders, charities such as the Royal Horticultural Society and the Food Share Network, community gardens organizations in Lincoln, school growing projects, health care organizations, religious organizations, and in general the various disadvantaged sectors of the society (unemployed, homeless, mentally and physically ill).

The support of ISABEL was instrumental in extending the food strategy and the community biogas approach to 4 more sites located in different location of Lincolnshire:

- Brookenby village, an ex Minister of Defence (MOD) site of around 700 inhabitants.
- Newtoft village, an ex MOD site, part of the Toft Newton civil parish with an overall population of around 500 inhabitants.
- Park Ward, a deprived neighborhood in Lincoln City.
- Washingborough Academy, a school just outside Lincoln City known for innovation.

The above mentioned Ministry of Defence (MOD) sites share the same “story” of de-commissioning and current challenges in terms of lack of community assets and services.

The promoter of the Lincoln food strategy has good connections with the Lincoln City Council, including the planning department. There is already a strong network in place between various organizations running community gardening and food poverty projects. In general, it seems to be a favorable moment for ISABEL to engage with the stakeholders and assist in the formation of a biogas community initiative.

4.2.2 Community's Vision and Strategy

Indoor Lincoln City Market

From an infrastructural point of view - For the indoor market an initial vision is to host a micro AD system which would allow the recycling of food waste into vegetable growing areas hosted inside the market. Potential sources of waste include: cooked waste from restaurants and stalls within the market and in Lincoln, and unusable/unused food from the food share network (redistribution of out of date food). Depending on the size of the system, the collection could include food waste from nearby households, restaurant and schools. Garden and green waste treatment will be integrated with existing composting facilities.

There is currently no municipal food waste collection in Lincoln, therefore the scheme could develop the opportunity for under and unemployed people to participate in the waste collection, under monetary and in-kind retributions (such as food from businesses participating in the strategy). Collection of food waste from throughout the community would raise visibility and awareness of the market project as an innovative food-growing hub.

Digestate would be re-utilised in the growing areas inside the market and the surplus would be re-distributed to the other food growing projects included in the overall Lincoln food strategy.

The covered market project aims to be a social project encouraging economic regeneration, education and training centred around food growing, cooking and retail with the aim of alleviating food poverty and growing in a sustainable manner. The market will act as a hub for the Lincoln food strategy, but also the centre of a wider movement and projects within Lincolnshire and beyond. A hub catalysing other connected projects.

The community biogas is embedded in a holistic strategy and long term vision, which encompass different themes:

- Food for health, alleviating food poverty and reskilling around basic cookery skills
- Showcasing and training in gardening techniques which are accessible to those with very limited space, time and money
- Gardening as therapy for (mental) health and exercise (cancer recovery)
- Commercial opportunity, improve environment for traders, make the market a place to visit
- Connection of restaurants (low or subsidised rents) cooking produce from gardens
- Training and education opportunities in growing and cooking (and potentially other areas as opportunities arise).
- Community connection and focus is extremely important, especially in providing new job opportunities.
- Vision of hub connecting community. Training in cooking, waitressing, front of house etc.
- Sustainable growing techniques including closed loop approaches
- The project will be designed to meet the specific needs of its community and to enable new ideas to flourish from that starting point. As such it fits well with the "smart place" concept which we are espousing.

The material connections enabled by the anaerobic biogas system would enable and be enabled by the social connections, a virtuous circle. In this sense the anaerobic digester could be seen as a "health" infrastructure, which would provide well-being and welfare benefits to the community, therefore unlocking different sources of funding beyond the classic energy and waste framework.

It is planned to create a Community Interest company in order to have the power to access to public and charity funding.

Ex MOD sites

The airfields at Brookenby and Newtoft and surrounding villages have ample supply of grass cuttings each year which they need to dispose of in maintenance operations. At the moment the council also cuts the grass in the villages around Brookenby.

Land and buildings in both Brookenby and Newtoft are in plentiful supply for not only the feedstock but also for space to host the digester. Infrastructure and access are good.

All sites are deprived communities with social problems, new housed biogas development to provide a valuable social function.

MOD sites have community associations and community officers which would provide direct and established routes of engagement with residents and possible community champions.

4.2.3 Community's Action Plan

The ISABEL partner have only recently established contact with the Lincoln market community, via a representative attending the second Hockerton workshop. The community is very much at the unawareness phase. Working closely with the community the UK ISABEL team plan and execute the following actions

(M1-M3) engagement with stakeholders: There is a need to continue the engagement to further raise awareness within the catchment area through the following channels;

- **Direct contacts:**
 - It is acknowledged that any community is made up of individuals which adopt either conscious and unconsciously the role of influencers, promoters, gatekeepers, leaders, experts. Therefore the goal is work to continue to understand the social- political landscape of the community and there by identify opinion formers and earlier adopters by working with the individuals who have initiated the the vision.
- **Strengthening community;**
 - The use of social events in local public houses has been demonstrated as an extremely successful route of creating community spirit and 'buy in' to community energy project as illustrated in Aston Hayes project. Therefore working with landlord of the central Hockerton public house the UK ISABEL team to create a vibrant community willing to commit to the vision
- **Explore collaboration with nearby villages**
 - The MoD sites are surrounded by a number of villages.. Therefore it is planned to contact the parish councillors to open a line of engagement.
 - Engaging additional local communities if successful, could lead to installing a biogas unit with greater capacity which would the therefore enhance the economics of the community energy proposition.

(M1-M3) creation of a local team/steering group

- As has been stated it is recognised that 'champions' will emerge from within the community and will become the principle actors.
- Therefore to foster the ambition and emerging vision a steering committee will be created and formal structure for decision making established and ratified.
- The local steering committee which will include a member of the UK ISABEL team will forge a structured working relationship.

(M1-M4) mapping of assets and resources in the community

- As stated there is a need to develop a clear understanding of the community assets in terms of availability of organic material, potential sources of labour, markets for local food products, options for installing biogas unit etc.
- To conduct the local 'audit' a variety of approaches will be used. For example structure interview, online surveys, and direct canvassing of the community.

(M2-M4) workshops to develop theory of change-participative

- A series of workshops will be arranged with the Lincoln market community and the villages close to the MoD sites, with view of bringing all parties together to begin so as to 'crystallise' the vision and associated strategies to develop a SI driven biogas project.
- With financial support from the ISABEL team generated via sponsorship a whole day will be allocated to allow full 'buy in' and realisation of the vision through an active participatory engagement.

(M3-M5) co-design workshop: "initial evaluation phase"

- Having conducted a series of Participatory workshops aimed at developing and strengthening the communities vision the next phase is to transition into evaluation phase (Ref D1.4)
- To assist the transition to initial evaluation phase a series of co-design workshops will be held where the ambitions and goals are further refined developing clear definitions as to expect output.
- A key component of the Participatory evaluation establishing types and value of costs and benefits perceived by the community

(M5-M8) refining the scenarios: (consolidation of evaluation phase)

- In order to support the community to undertake a thorough evaluation of the potential of a SI driven biogas project the ISABEL partners will support comprehensive feasibility study covering the following elements;
- **Assessment of biogas technologies**, covering feed stock management, gas production, gas clean up, gas storage/distribution and post production digestate management
- **Product-Evaluation of the type and configuration**; gas type 'crude biogas' or refined biomethane. Routes to add value to digestate. While energy generation is the clear goal of the proposed project there are a number of opportunities where the appropriate waste management enable extraction/recovery of additional value. Therefore there will be attempt to define the range of potential products their specification and the required infrastructure required to realise the potential.
- **Marketing-assess the route to market for new and existing products**; The objective will be to assess/evaluate and explain the creation of new or 'me-to' products and or services. At the same time develop a Product Marketing Plan Methodology to provide a high level description of how the organization will market its product or service.
- **Market Research- assess market and corresponding strategy**; While distinct the work does integrate with the marketing section. The objective is to develop a clear understanding of the current market, value, volume locally and regionally. At the same time establish where possible any Unique Selling Position (USP), i.e. opportunities to differentiate a position within the market.
- **Financial/Economic-assess overall potential viability**; Financial projections are central to any new project selection. The objective is to provide a description of the financial projections the new initiative is expected to yield versus estimated costs. The work will also derive key the assumptions on which the illustrated financial projections are based.
- **Evaluate Legal Requirements and Tax Obligations**; The objective is assess all legal and financial obligations. Thereby enable the planned organisation to comply with certification

where appropriate, for example PAS110 regulations with regards to food waste management and associated digestate.

- **Assess Social, Environmental, Sustainability impact** Apart from the financial criteria any project evaluation must also include social and environmental aspects in order to address the three cornerstones of sustainability. Therefore the social and environmental impact will be assessed and output used to assist the design of an organisational/managerial structure.
- **Organizational/Managerial Feasibility;** The objective is to describe and optimise a business organisation that would facilitate efficient operation of the business model.
- **Operational- assess the resource requirement and management;** Evaluate how to take advantage of the opportunities identified. Specifically the labour and infrastructural requirements will be assessed and described. It is not intended to include a detailed schedule as this would be developed during project planning. However the objective is to provide milestones and time frames for completion as a guideline only.

(M8-M10) “Transition to adoption phase” workshops: selection of “ideal” biogas community

- The feasibility study executed during M5-M8 provides the foundation about which a business model will be formulated that aligns with the communities vision
- During the adoption phase the ISABEL partners will support the community to develop a comprehensive business plan that incorporates the foundation provided by the feasibility study and builds on the business models articulated as outputs of the co-design workshops.
- In addition to the business plan a management/operational plan will be prepared a first draft and used to underpin the transition into the implementation phase.

(>M10): Implementation phase.

- Moving from adoption to implementation the ISABEL partners will support the preparation of a detailed project plan which will cover all the operational, financial and legal components and the associated task will be clearly articulated and scheduled.
- The community will produce a full project plan to support the business plan which will be the main instrument whereby finance will be raised for the project.
 - The route whereby funds are raised will be illustrated in the business plan, particularly if the community itself become a major share holders

4.2.4 ISABEL Support Services in Action Plan implementation

The ISABEL partners will actively support the Lincoln market community throughout the evolution of the project. The support services provided to the Hockerton community will reflect the distinct phases the project is expected to transition through and are summaries as follows;

Unawareness-Awareness Phase

- As stated the ISABEL team will continue to foster engagement by lobbying/canvassing the ‘greater Lincoln market and MoD communities including the surrounding villages.
- Further Participatory and co-design workshops will be arranged and delivered by the ISABEL team where Participatory theory of change support ‘lincoln market communities to transition from awareness to the evaluation phase.
- The UK team have discussed the importance of develop an interactive Digital platform. The web portal will become a repository for the information generated within the workshop and in the initial

stages foster learning, communication, sharing across communities, connection with other actors, through the provision of social media tools such as blogs, forum etc..

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