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CIP Eco-innovation
Pilot and market replication projects
Call 2012

Call Identifier: CIP-EIP-Eco-Innovation-2012

D6.8 POLICY MAKERS REPORT

DIGESMART

CONTRACT ECO/12/332882



Project website: www.DIGESMART.eu

DIGESMART PROJECT: **DIGES**tate from **MA**nure **R**ecycling **T**echnologies

www.DIGESMART.eu



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INTRODUCTION

This report is the deliverable 6.8 of work package 6 of the DIGESMART project. The report is focused on communication to policy makers of DIGESMART solution.

DIGESMART project has had as target to help to reduce environmental impact of farm waste, stimulate biogas implementation and produce low carbon footprint fertilizers. Therefore, policy makers should be aware of the potential benefits of the proposed solution because it is aligned with the national and European environmental targets.

This report includes a **summary of practical results and benefits of the DIGESMART solution to promote among policy makers** as well as a **description of specific dissemination actions developed and main points of discussion with them**. Those dissemination actions were focused on policy makers belonging to public bodies and institutions interested in the adoption of new models for farm waste management and renewable energies sources promotion in Belgium, Italy and Spain. Several dissemination actions carried out made it possible to communicate the DIGESMART solution benefits for both the environment and the society to European, national and regional policy makers through specific bilateral meetings and presentations. At the same time, several discussions focused on current legislative framework related to the use of digestate streams were held in those actions.



1. MAIN POINTS OF COMMUNICATION WITH POLICY MAKERS

1.1 DIGESMART CONCEPT

An oral presentation was developed to include main aspects of DIGESMART project. This presentation made it possible to explain the concept of the project to policy makers. The presentations are included as annexes of this deliverable. Below it is included an updated Figure related to the simplified diagram of the DIGESMART main processes.

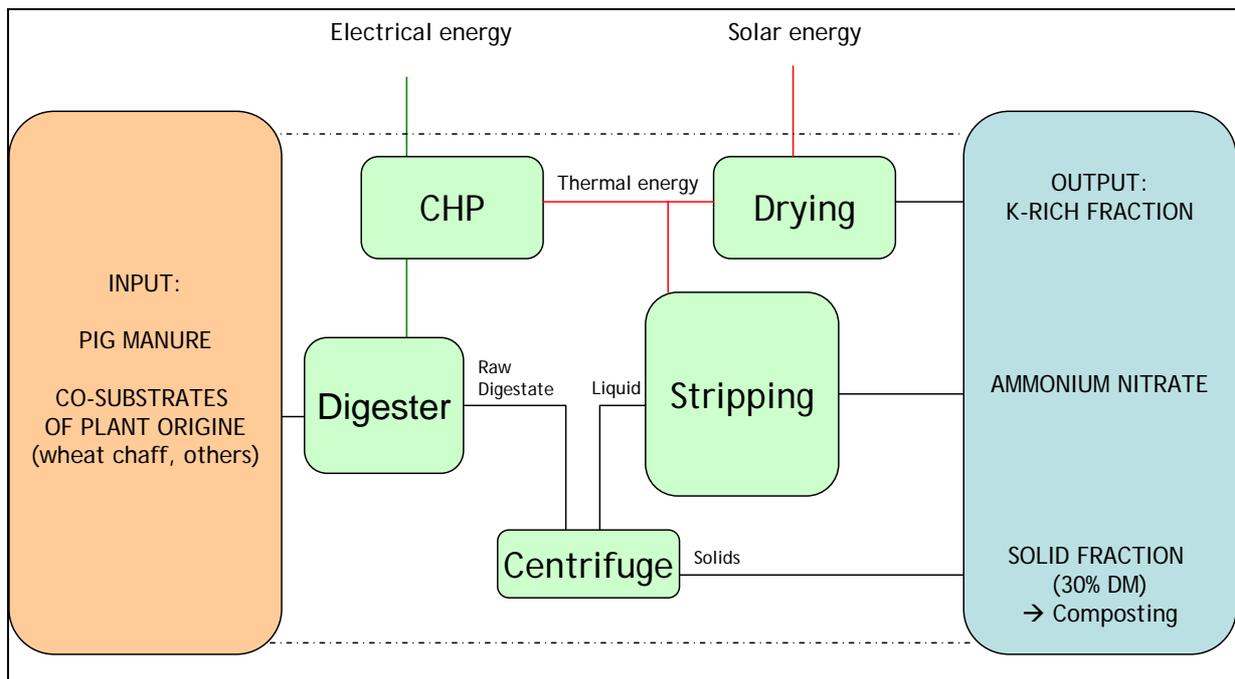


Figure 1. Simplified diagram of DIGESMART processes

DIGESMART solution was tested at demo scale in DIGESMART project. As main advantages of the solution for digestate treatment in comparison with traditional handling of digestate, it is important to highlight the following attained tasks:

1. Lower transport costs of thin potassium rich fraction of digestate instead of transportation of raw digestate to be applied in the agricultural soil.
2. Production of a green fertilizer (additional income for biogas plants) replacing artificial fertilizers. It has been produced ammonium nitrate (18%N) but it is possible to adjust part of the process and to produce ammonium sulphate instead of ammonium nitrate.



1.2 BENEFITS OF DIGESMART SOLUTION FOR THE ENVIRONMENT AND SOCIETY

Main environmental and society benefits related to DIGESMART solution in farm and biogas sector are described below. These benefits were shared with all the dissemination activities among policy makers at different levels. In addition to that, it is provided an example of quantified benefits for one DIGESMART solution implementation.

- ▶ Reduction of environmental impact of livestock exploitations

The solution makes it possible to reduce the environmental impact of animal manure of livestock exploitations by providing a more rational use through biogas production (GHG emissions reduced) and valorisation of digestate (valorisation of nutrients). Moreover, it enables the reduction of fossil fuels consumption related to animal manure/digestate transportation to agricultural fields.

- ▶ A more rational use of all the different waste streams (nitrogen and water recovery)

The implementation of the solution facilitates the rational use of all the different waste streams from intensive livestock farming/biogas plants in a sustainable way. Among the different streams, it is noteworthy to mention the production of green fertilizers for nitrogen recovery from organic waste (mainly animal manure). These green fertilizers (product) with low carbon footprint are made by using thin digestate fraction and could be an income or reduction of animal manure treatment cost for certain regions.

Furthermore, it is possible to adjust DIGESMART solution to other scenarios and include after the stripping other technologies to foster water recovery. In the Netherlands, the partner DETRICON has also implemented a version of DIGESMART project which makes feasible both nitrogen and water recovery.

- ▶ Development of new models for farm waste management

The solution contributes to the adoption of new models for farm waste management and renewable energy sources (biogas) promotion since it provides a competitive post-treatment of digestate. Therefore, it promotes an improvement of the competitiveness of biogas plants in certain scenarios in which it is suitable to introduce the technology.

- ▶ Circular economy

As it is stated by European Biogas Association, anaerobic digestion is an important pillar of the European circular economy: it mitigates GHG emissions (valorisation of animal manure through biogas production), recycles nutrients in the form of organic fertilisers, prevents nitrogen leakage into groundwater and avoids the spread of harmful diseases through landfilling. Additionally, AD is a vital part of the European bio-economy tapping into leftovers of other industries and thereby improving European resource-efficiency.

Therefore, DIGESMART solution contributes to anaerobic digestion implementation and circular economy because it incorporates treatments to upgrade digestate into green fertilizers and reduce transportation costs of raw digestate.

► Rural development

At the moment, the anaerobic digestion sector employs over 70000 people and there is potential for a more growth through adequate treatment of biowaste. In the case of municipalities and companies dealing with waste management, besides their fees for treating this material, they can increase their revenue by producing energy and fertilisers. Similarly, farmers treating their waste can either sell these products or use them for self-consumption (source: EBA, 2015).

DIGESMART solution could help to increase anaerobic digestion of biodegradable waste. That would create new jobs and economic opportunities related to this waste treatment. In particular, the solution would encourage development and diversification of activities in rural areas thanks to the creation of new jobs and related to green fertilizers production and use.

Also, it is provided below an example of the benefits from each DIGESMART plant. It has been quantified the main benefits for a biogas plant running mainly with animal manure which produces around 30000 t/year of liquid fraction of digestate.

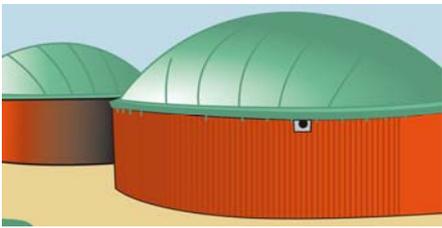
	Example: 30000 t/year (liquid fraction of the digestate)
Energy production (MWh/year) *350 kWe installed	7000
Savings of CO ₂ (t/year) *Factor 278 gCO ₂ /kWh	1946
Nutrients recovered (t Nitrogen/year)	120
Savings in transportation costs (€/year)	80000

Figure 2. Example of quantified benefits of one implementation of DIGESMART solution



1.3 PRACTICAL RESULTS

A comparative test for the DIGESMART project was done in Belgium and Italy. Field trials tests with the green fertilizer and with the artificial fertilizers were performed using horticultural and cereals crops. The results from the tests showed that there is no significant difference between treatments. The same outcome was achieved concerning nitrogen content of the crop and chlorophyll level. The nitrate residue in the soil that was measured at harvest was lower than 50 kg NO₃-N/ha for each treatment and no significant differences were observed. These results clearly indicate that the recovered products can be used to replace artificial chemical fertilizers.

Main conclusions related to the use of ammonium nitrate and potassium rich fractions as fertiliser are summarised below.

- ▶ The green fertilizer (ammonium nitrate) is a liquid product which can be applied using equipment similar to the currently utilized for other liquid fertilisers.
- ▶ A competitive use for the green fertilizer could be horticulture (both open field and in green-house).
- ▶ The low carbon footprint of the green fertilizer could be valorised over the value chain. For certain European markets, an informative label could be added indicating “Produced with Sustainable inputs”, so that the consumer would give the product an extra value.
- ▶ Registration of the product is different for each involved country. It is foreseen that a new European legislation related to fertilizers enters into force in 2017 and facilitates the introduction of DIGESMART main product (ammonium nitrate) in all the EU countries.
- ▶ The potassium rich (K-rich) fraction can be used by the owner/producer by complying with the legislation on digestate management. The results of the microbiological analysis showed absence of *Salmonella spp.* in 25 grammes and *E. coli* below $<1.0 \times 10^2$ colony forming units (CFUs) per gramme in the first implementation trials results. It is important to mention that this value is not only influenced by the stripping/scrubbing process but also by the previous anaerobic digestion process.

1.4 VISITS OF POLICY MAKERS TO THE INSTALLATION

As part of the communication to policy makers, visits to the demonstration site DIGESMART in IVACO Facilities (Gistel, Belgium) were offered to policy makers from Spain, Italy, Belgium and at European Level. In particular, Belgian policy makers and European policy makers attended the planned visits to the installation. In relation to that, it is important to mention that BIOGAS-E led the visit for the Belgian stakeholders on the 15th April 2016 and, also, coordinated the visit on the 29th



September 2016 in the framework of European Biogas Association (EBA) Conference 2016. More information about the dissemination at EU level in the EBA Conference is provided below.

On the 15th April 2016 during the visit of the Belgian stakeholders, Niko Vanaken of OVAM (Flemish Waste Agency) attended the visit. Also some one from the permitting authority attended, this was Isle Devreese (LNE).

2. ACTIVITIES ADDRESSED TO POLICY MAKERS

2.1 ITALY

2.1.1 Communication acts at regional/national level

One meeting was done at Piedmont Region on 25/01/2016 with 2 people: 1) responsible of the nitrogen directive implementation at regional level and 2) responsible of the authorization of biogas plants. UNITO illustrated them the DIGESMART plant solution and they were positively impressed by the solution; however they point out that, under current interpretation of the law, the nitric acid will count toward the organic units of nitrogen (and therefore, included in the limit of 170 kgN/ha and year), and this may hinder the usage of the technology in Italy.

A second meeting was done on 5/08/2016 during a meeting of "Consorzio Monviso Agroenergia" to see the issues that could be of interest for them. The owners of biogas plant within the consortium they needs to use of the digestate to fertilize their crops and they have enough land to spread it. Given the actual legislation framework, it is not of interest for them to make a fertilizer to sell it out of the farm and then purchase a mineral fertilizer. UNITO discussed the issue of long transportation distances of digestate/animal manure, but the biogas plants in Piedmont region have maximum distances below 30 km and this make the DIGESMART solution not economically sustainable for them. Current situation and digestate management of those plants were discussed. None of the plants have problems with digestate management since there is enough agricultural area to spread digestate.

2.2 BELGIUM

2.2.1 Communication acts at regional/national level

On 24/06/2016 a workshop was given at OVAM (Flemish agency for the recovery of materials) with Detricon. A presentation was given by ir. Denis De Wilde and a discussion took place with other



agencies for waterbodies, waste, agriculture and politicians. The focus was on transition project towards a circular economy and the challenges they face.

2.3 SPAIN

2.3.1 Communication acts at national level

A bilateral meeting at National level was carried out on the 22nd March 2016. AINIA organized the meeting in which participated staff from Agricultural Department of National Government in Madrid. Unit: General Directorate of Production and Agriculture Markets ("DG Producciones y Mercados Agrarios"), Ministry of Agriculture, Food and Environment (MAGRAMA).

The presentation included as an annex was used to explain the benefits of the project as well as main technical aspects of the project. However, this presentation was used as a basis to start further discussions related to the solution developed in the project. Main questions and items of discussion between AINIA and MAGRAMA during the meeting are described below:

- Register of nitrate ammonium under Spanish national regulation

It is stated that the main product of DIGESMART solution (ammonium nitrate) could be registered as organic fertilizer under the current regulations (March 2016). The national register would authorize it or not depending on whether the requirements are covered.

- K-rich fraction after stripping process

K-rich fraction after stripping is under discussion since it means a significative volume to spread on agricultural plots. There is a low reduction in terms of volume of digestate after DIGESMART solution (without solar evaporation process). This K-rich fraction has a low content on nitrogen depending on the performance of stripping process, and, optionally, the solar evaporation process. It was pointed out that it would be important to analyse the K-content in order to avoid future problems of soil salinity (loss of soil structure at long-term) due to high conductivity. From a legal point of view, the public body responsible for Environmental license would be in charge of evaluating this issue in practical terms.

- Heavy metals in digestate streams

It is discussed the issue of heavy metals content in digestate streams and specific case of DIGESMART solution. Since raw materials from DIGESMART solution would be mainly animal slurry used, only heavy metals which would be present in raw animal slurry would be also potentially in digestate. In case of DIGESMART solution which includes solid-liquid separation, it was stated by AINIA that the solid fraction will potentially concentrate the heavy metals. This fraction is frequently composted. Therefore, it is concluded that this point will not be problematic but zinc



and iron should be measured following quality compost regulations. Good fertilising practices with mentioned materials should be followed in order to avoid heavy metals accumulation at long-term as it is advised usually for compost applications.

2.3.2 Communication acts at regional level

Cataluña

A bilateral meeting at National level was carried out on the 4th July 2016. AINIA organized the meeting in which participated people in charge of Agricultural Department of Regional Government of Cataluña (Catalonian Waste Agency) in Barcelona.

Similar to national level dissemination action, the presentation included as an annex was used to explain the benefits of the project as well as main technical aspects of the project. However, this presentation was used as a basis to start further discussions related to the solution developed in the project. Main questions and items of discussion between AINIA and Catalonian Waste Agency during the meeting are described below:

- Digestate streams regulations and competent authority at regional level (Cataluña)

Competent authority at regional level is Catalonian Waste Agency in case of biogas plants which use co-substrates being these the majority of plants in Catalonia as only two biogas plants do not introduce co-substrates. In case of co-substrates use, the digestate is considered as a waste, so that digestate stream after stripping process would be also considered a waste if it comes from mentioned biogas plants. Under these current regional regulations, it is necessary that the mentioned biogas plants have the "Waste Management Authorisation" or that their waste is managed by an "Authorised Waste Management Company".

On the other hand, ammonium nitrate would be considered as a product after national registration and their application will not be controlled by Catalonia Agency Waste.

- Minimum requirements to the K-rich fraction after stripping and use of ammonium nitrate

K-rich fraction after stripping is further described as a material that it is foreseen to spread in closer locations to the biogas plant (low nitrogen content, estimated as mean value 0.4-0.5 kgN/t of material). It is stated as a strong point of the solution the lower transportation costs of digestate due to lower nitrogen content of mail digestate stream. However, this material has still the same concentration in potassium as the liquid digestate before stripping. Then, as it was previously discussed the analysis of the conductivity of K-rich fraction is important in order to avoid potential problems of soil salinity related to recurrent irrigations on the same agricultural plots with mentioned fraction.



In particular, the minimum requirements at regional level to spread this fraction will be organic matter and nutrients, to evaluate and justify agricultural use. This will be relevant in order to fix the dosage and it may condition the application distance from the biogas plant.

- Agricultural plots surface availability certification

It will be necessary to carry out an environmental formalization process in case of DIGESMART solution implementation in a biogas plant. It is estimated that agricultural plots availability would be recalculated and potentially reduced. It would be necessary to properly justify that the system makes possible a nitrogen reduction of the fraction and to provide analysis of the fractions following regional regulations.

- Monitoring of digestate streams applications by Catalonian Waste Agency

Currently, the dosage to agricultural plots is adjusted following the crops needs. Biogas plants have to make chemical analysis of digestate and agricultural soil plots where it is spread. Among regional regulations, it is important to highlight the Program 136/2009 Vulnerable Zones where it is stated that the nitrates and phosphor (maximum 150 ppm) should be controlled by the farmer. Catalonian Waste Agency follows up the soil analysis of digestates.

- Vulnerable zones in Cataluña

Problems related to high livestock density are located in Gerona and Lleida (Osona, Vic). Mapping of livestock density are available for the whole region of Cataluña.

- Input materials of the biogas plant where the DIGESMART solution was tested

Pig slurry is the main input (>80%) material of biogas plant used in DIGESMART Project. However, vegetable waste is used as co-substrate.

Castilla La Mancha (CLM)

A bilateral meeting at National level was carried out on the 6th July 2016. AINIA organized the meeting in which participated people in charge of Agricultural Department of Regional Government of Castilla La Mancha (“Consejería de Agricultura, Medio Ambiente y Desarrollo Rural. Dirección provincial de Toledo”) in Toledo.

Similar to national level dissemination action, the presentation included as an annex was used to explain the benefits as well as main technical aspects of the project. However, this presentation was used as a basis to start further discussions related to the solution developed in the project. The main items developed during the meeting between AINIA and Agricultural Department at Regional Level (“Consejería de Agricultura. Dirección provincial de Toledo”) are described below:



- Areas with high livestock density and vulnerable zones in Castilla La Mancha

Problems related to high livestock density are located in Polán (Toledo) and Pueblo Nuevo (Ciudad Real). Around 60% of Toledo represents vulnerable zones. Currently, management of pig manure is directly applied into the soil (main option in the Region for the use of pig manure) or through Waste Management Companies.

- Organic waste available for biogas sector development in Castilla La Mancha Region

It is analysed the issue of organic waste availability in Castilla La Mancha Region. Currently, there are available two inventories of organic waste (PROBIOGAS project inventory and a specific inventory for the Region). The public body is interested in both results. It is discussed whether it has changed the number of companies in Castilla La Mancha since both inventories were done (3-4 years before). It is stated by the public body that it has not been many changes in terms of food companies in the Region.

- Problems related to long transportation distances of digestate/animal manure in CLM

It is discussed the issue of long transportation distances of digestate/animal manure in specific cases where there is not enough agricultural area to spread it. Those transportation distances are translated in high costs and environmental impact related to it. DIGESMART solution helps to reduce those distances making a better valorisation of digestate into ammonium nitrate. This issue is analysed for the specific case of Castilla La Mancha. In this case, the issue is mainly related to animal manure management and biogas plants are less common than in Catalonia Region. Currently, only 4 biogas plants are running in Castilla La Mancha. Two additional big biogas plants were shut down on 2014 (8 MWe x 2 engines), which are currently in bankruptcy.

Castilla y León (CL)

A bilateral meeting at National level was carried out on the 7th July 2016. AINIA organized the meeting in which participated people in charge of ITACYL, an Agro Technological Institute and belongs to the Agricultural Regional Government of Castilla León (“Junta de Castilla y León, Consejería de Agricultura y Ganadería”) in Valladolid. In particular, the meeting was held with the Deputy Directorate of Research and Technology of the Institute and two researchers of Waste Management Research Line.

Similar to national level dissemination action, the presentation included as an annex was used to explain the benefits as well as main technical aspects of the project. However, this presentation was used as a basis to start further discussions related to the solution developed in the project. Main questions and items of discussion between AINIA and Agricultural Department at Regional level (“Junta de Castilla y León, Consejería de Agricultura y Ganadería”) are described below:

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- Areas with high livestock density and vulnerable zones in Castilla León

Problems related to high livestock density are located in next provinces: Segovia, North of Palencia and Salamanca. Vulnerable areas are located there as well. Currently, management of pig manure is directly applied into the soil (main option in the Region for the use of pig manure) or through Waste Management Companies like in Castilla La Mancha. In case of Segovia, the problematic issue is due to specific properties of the soil texture (sandy soil) which is very permeable.

- Monitoring of animal manure applications in Castilla León

Nowadays, application control of animal manure is carried by a log book but there is not an exhaustive control and analysis of samples is not required.

- Problems related to long transportation distances of digestate/animal manure in CL

It is discussed the issue of long transportation distances of digestate/animal manure in specific cases where there is not enough agricultural area to spread it. Those transportation distances are translated in high costs and environmental impact related to it. DIGESMART solution helps to reduce those distances making a better valorisation of digestate into ammonium nitrate. This issue is analysed for the specific case of Castilla León. In this case, the issue is mainly related to animal manure management and biogas plants are less common than in Catalonia Region. Currently, only 3 biogas plants are running in Castilla León. Current situation and digestate management of those plants are discussed. None of the plants have problems with digestate management since there is enough agricultural area to spread digestate.

- Adjustment of DIGESMART solution to farms/biogas plants of Castilla León

In case of Castilla León, it is stated that DIGESMART solution could be potentially more interesting for farmers of the region if it was possible to transport the prototype and to share costs among several exploitations.

- Permits of biogas plants in Castilla León

In case of Castilla y León, biogas plants permits are managed at province level instead of at the regional one. Permits related to digestate management are also regulated at province level in case of this Autonomous Community.



2.4 EUROPEAN LEVEL

2.4.1 Communication actions at EU level

Presentation of DIGESMART project in European Biogas Association (EBA) Workshop

A presentation of DIGESMART project in European Biogas Association (EBA) Workshop on 6th April 2016 was held on Renewable Energy House located in Brussels. The title of the presentation was “The circular economy of digestate: logistic, energetic and economic aspects”. DEIAFA and BIOGAS-E participated in the event developing a specific presentation of the solutions of DIGESMART project (Annex).



Figure 3. BIOGAS-E carried out a presentation in EBA Workshop for EU-policy makers among other stakeholders

Over 35 participants from ten different countries across the European continent had the opportunity to know the benefits and practical results of DIGESMART project. Among the attendees there were biogas companies, grid operators, EU-policy makers, national biogas associations as well as EU umbrella associations. The aim of the Workshop was to establish the significance of the anaerobic digestion (AD) sector within Europe’s Circular Economy: benefits of AD for bioeconomy, Nitrogen Cycle and advantages of AD to Europe’s agriculture, biorefinery concepts, DIGESMART project concept and market processed digestate strategies. As part of the workshop, it was also discussed the importance to have in place the right EU legislation on both waste and fertilising products. During the event, Johanna Bernsel and Eric Liegeios from the European Commission introduced the new EU proposal to include organic fertilising material within the Fertilisers Regulation. Participants had several questions on how to produce CE marked fertilisers. The Commission encouraged those present to give written feedback on the proposed text, which their service will compile and then forwarded to the European Parliament and the Council.



Specific bilateral meetings at EU level

A bilateral meeting at EU level was carried out on the 25th February 2016. AINIA organized the meeting in which participated staff from Research Programme Officer (European Commission, DG Agriculture and Rural Development, Brussels/Belgium).

A presentation (included an annex) was used to explain the benefits of the project as well as main technical aspects of the project. However, this presentation was used as a basis to start further discussion related to the solution developed in the project. In addition to that, it was possible to get some feedback from the presentation itself thanks to comments from both participants of the meeting. In particular, it was highlighted that it would be necessary to include for policy makers presentation more information related to business plan as well as practical aspects of the solutions such as hygienic properties of residual fraction of digestate, storage necessities, logistics related to commercialization of the product (green fertilizer), seasonality of use of the green fertilizer and business model economical sustainability.

As a general suggestion for further dissemination of the project, it was stated that EIP network (<http://ec.europa.eu/eip/agriculture/>) would be a useful tool to share practical results of DIGESMART to the end-user including technological solution concept, costs and performance. Therefore, it was shared through EIP-AGRI (“Agriculture and Innovation”) the DIGESMART project profile in order to further disseminate the results of DIGESMART project at European level. It is provided below a “Screenshot” of the “Sharepoint” section where it is possible to see the profile among registered users as well as visitors of the website. At the moment of consultation [August 2016], there were registered 2695 users in this website.

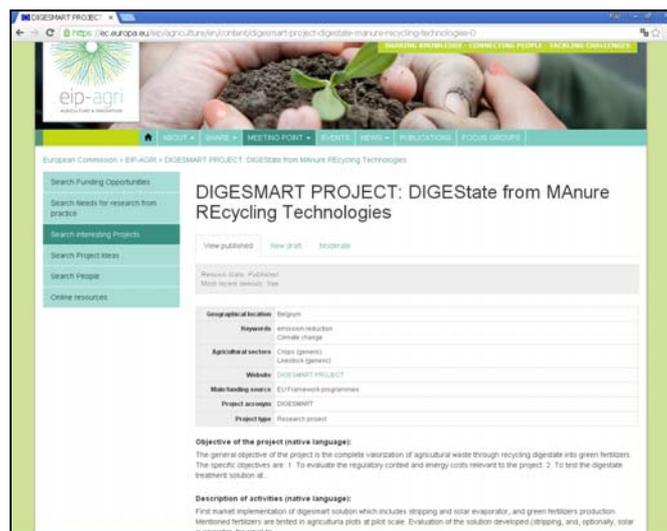


Figure 4. DIGESMART project in EIP-AGRI website



Visit tour linked to EBA Conference in September 2016

BIOGAS-E organized a visit tour of the DIGESMART plant on the 29th September 2016 linked to European Biogas Association Conference 2016 (see figure below with the dissemination of the visit in Twitter). In this visit tour some policy makers attended the visit making possible a wider dissemination at European and international level among interested policy makers such as policy makers from VCM (Flemish Coordination Centre for Manure Processing), Swiss Federal Office of Energy SFOE, US Environmental Protection Agency (United States) or the OCE ministry of water and electricity - KSA (Saudi State), among others. Also, other stakeholders such as Swiss Biomass Association or the European Biogas Association had the opportunity to visit the plant.

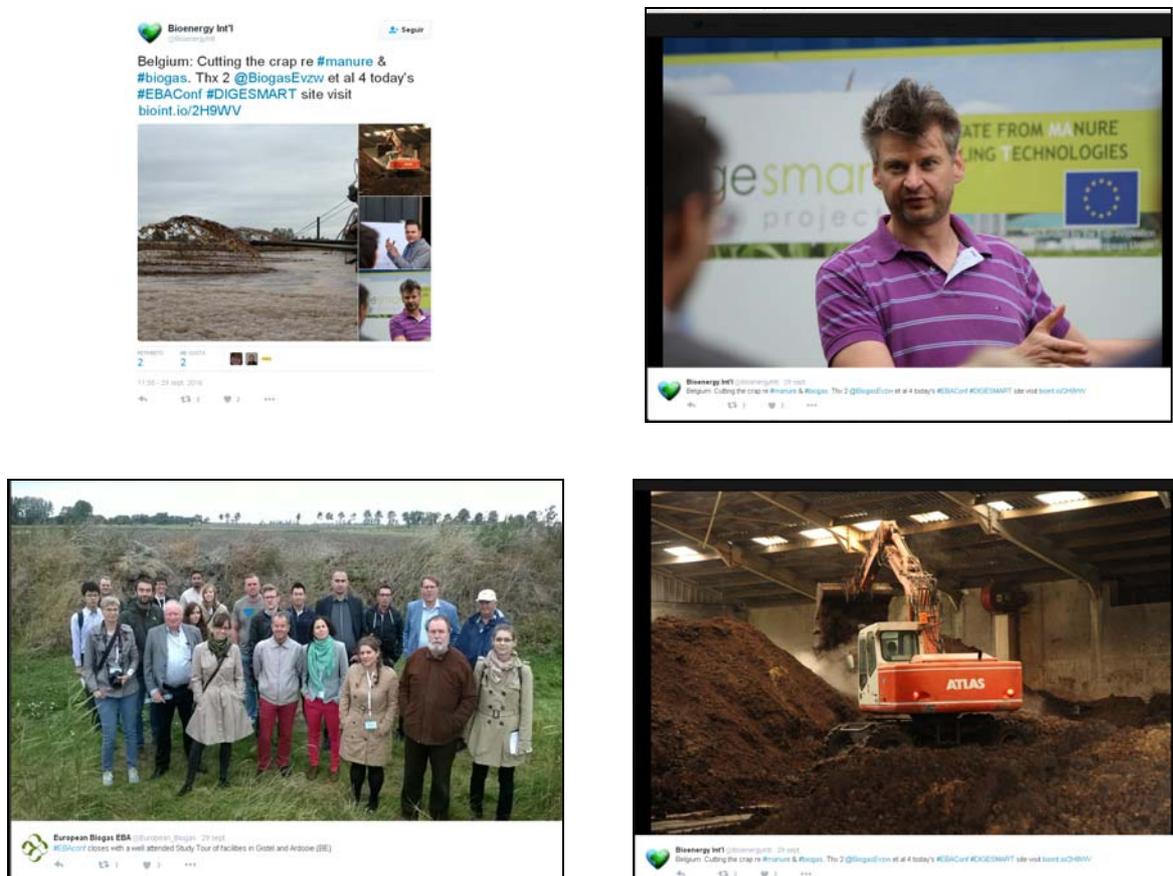


Figure 5. Twitter dissemination of visit tour of DIGESMART plant linked to EBA Conference 2016



ANNEX: PRESENTATIONS

- Bilateral meeting at EU level (25/01/2016, AINIA).

Presentation: "PMOP_spanish_version_25_01_2016"

- European Biogas Association Workshop presentation in Brussels (06/04/2016, BIOGAS-E/UNITO).

Presentation: "3_Digestate-and-Circular-economy-the-DIGESMART-project-Jonathan-De-Mey-Biogas-E"

- National meeting in Spain (22/03/2016, AINIA).

Presentation: "PMOP_english_version_22_03_2016"

- National meeting in Belgium (24/06/2016, DETRICON).

Presentation: "Detricon - nutrient recovery (English)"

- Regional meeting in Spain (04/07/2016, AINIA).

Presentation: "Regional Level_Cataluña_PMOP_english_04_07_2016"

- Regional meeting in Spain (06/07/2016, AINIA).

Presentation: "Regional Level_CLM_PMOP_english_06_07_2016"

- Regional meeting in Spain (07/07/2016, AINIA).

Presentation: "Regional Level_CL_PMOP_english_07_07_2016"