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FERTIMANURE

Deliverable

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D6.8. FERTIMANURE plan for exploitation and dissemination of results

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Preface

FERTIMANURE can contribute significantly towards a situation where optimal application of manure with minimal loss of nutrients can be achieved in all regions. The EU N fertiliser industry is an energy-intensive industry and contributes directly and indirectly to GHG emissions. FERTIMANURE sustainable production of N-fertilisers from animal manure will contribute to the challenging EU 2030 framework for climate and energy policies.

The main objective of the planned dissemination and exploitation activities is to raise awareness and efficiently transfer knowledge of FERTIMANURE achievements to end users, industries and SMEs, the academic community, and policymakers, to ensure replicability and adoption across Europe and CELAC countries.

D6.8 FERTIMANURE plan for exploitation and dissemination of results represents the final version of D6.1. Plan for exploitation and dissemination of results.

The report includes an updated overview of the concepts of Communication, Dissemination and Exploitation relative strategies and action plans that the consortium followed to promote the project, to foster the knowledge of its results and to ensure their uptake for future business opportunities. All these activities aim to help maximize the impact of achieved results.

This document follows the same structure as D6.1 and is divided into:

(i) **Communication and Dissemination Strategy**, and
(ii) **Exploitation**

Dissemination activities must be tailored in such a way as to reach the audiences most efficiently through appropriately selected dissemination channels and dissemination tools. The Exploitation segment is designed to multiply the impact of the proposed solutions and prepare the transition towards industrial and commercial uptake to fully achieve the expected impact.

The overall aim is to maximize the utilization of the dissemination potential of the FERTIMANURE consortium. To convey the right message to the right stakeholders, the most appropriate channels have to be used. The FERTIMANURE audience is manifold: (i) key agriculture and industry players, (ii) research and education community, (iii) policy makers and authorities, (iv) investors in bioeconomy, (v) industry of equipment supply, and (vi) rural communities and society.

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Summary

The FERTIMANURE plan for exploitation and dissemination of results (PEDR) is a strategic document for setting the impact pathway of FERTIMANURE since the project's beginning. The main objective of the FERTIMANURE project is to develop, integrate, test and validate innovative Nutrient Management Strategies to efficiently recover mineral nutrients and other relevant products with agronomic value from animal manure, to finally obtain reliable and safe fertilisers that can compete in the European fertilisers market.

FERTIMANURE have optimised and operated **5 different on-farm pilots** with different and complementary technologies that allowed to produce **18 different Bio-based Fertilisers** (BBFs). **The FERTIMANURE** project demonstrated the efficiency and effectiveness of the obtained BBFs and TMFs and their ability to replace current mineral fertilisers, including:

(i) **Tests under controlled conditions (incubation and pot-tests):** Assessment of: (1) N and C release patterns; (2) P plant availability; (3) Biological activated organic amendments as plant growth promoters; (4) Biostimulants assessment as plant growth promoters for the nutrient uptake and tolerance against hydric & saline stress. Crops under assessment: grass, ryegrass, tomato, radish, lettuce, swiss chard, spinach.

(ii) **Field validation in a real environment**: Agronomic performance in quadruplicate-randomized block design; Environmental performance, including nutrient efficiency vs losses. Crops under assessment: Winter wheat, silage maize, lettuce, sauerkraut cabbage, sugar beet, ryegrass.

Moreover, the FERTIMANURE project specifically provides **3 innovative nutrient management strategies**:

1) Direct use of the BBFs obtained by treating manure with innovative technologies (5 on-farm pilots);
2) Centralised TMF production;
3) On-farm TMF production.

This document is the final version of the **Plan for Exploitation and Dissemination of Results (PEDR) of the FERTIMANURE project**. The contents include an overview of Communication, Dissemination and Exploitation relative strategies, followed by performing activities that the consortium did to promote the project results and to ensure uptake for future business opportunities. Performed activities aimed to help maximize the impact of achieved results. The update of **PEDR** was during the project in months **16, 36 and 54**.

This document is structured in two sections:

- **PART 1: Communication and Dissemination Strategy**

Communication and dissemination activities play an important role in increasing the impact of an H2020 project. **Communication** aims to create awareness of the EU initiatives and promote the project and its results to a very differentiated target audience ranging from stakeholders and investors to the media and great public. **Dissemination** is more focused on fostering the transfer of knowledge created within the project to make the results available for others to use. The scientific community, the industrial partners, and the policymakers represent the target audience for a dissemination action.

COMMUNICATION

The main objective of communication is to reach out the society, beyond the project's own community and promote the impact and benefits of the EU-funded projects in a strategic and effective manner.

The research activities carried out must be outlined in a language that can be understood by multiple audiences, including non-specialists. Communication is relevant from the start of the project and the aim is to inform the audience on the goals and benefits of the project.

COMUNICATION STRATEGY

According to the Article 29 of the Grant Agreement “Unless it goes against their legitimate interests, each beneficiary must — as soon as possible — ‘disseminate’ its results by disclosing them to the public by

appropriate means (other than those resulting from protecting or exploiting the results), including in scientific publications (in any medium). This does not change the obligation to protect results in Article 27, the confidentiality obligations in Article 36, the security obligations in Article 37 or the obligations to protect personal data in Article 39, all of which still apply.

The Grant Agreement shows the obligation to communicate and promote project action and to do that without breaching the obligations of Article 29 on the dissemination of the results, reiterating the importance to take an integrated approach to carry out the communication together with dissemination activities to maximize the impact of the project.

FERTIMANURE workplan is fully committed to communicating project results and their benefits to the stakeholders and their benefits for the stakeholders to the widest possible audience.

- **PART 2: Exploitation**

This part provides a summary of the potential routes for their exploitation that project partners have envisioned at the beginning of the project, and which have been redefined as the project technically has progressed. The different sections include the proposed measures for exploitation and dissemination of results, including intellectual property management.

This section begins with a discussion of the impact potential of the project, both in terms of key outputs (*technologies, fertilisers and business models*), but also in terms of impacts on society, the environment and the related economic sectors.

In the following sections, what is discussed is the FERTIMANURE impacts on the market, in terms of the exploitation and commercialization strategy, business models and a CANVAS analysis of the two main business cases considered, the business model for farmers, and the business model for fertiliser companies.

Next, the different technological components of the project are evaluated and described in terms of their technology readiness level (TRL).

This report also includes the different measures and achieved results taken by the project to expand the dissemination of results, in terms of synergies with other projects, platforms, clusters, and the inclusion of important industry and government actors within the project consortium, which helps orient the project towards successfully replicable results.

Finally, intellectual property concerns are addressed, though many of these aspects are not to be published in this document due to the public nature of this deliverable, whereas consortium IPR documents are a confidential source.

FERTIMANURE

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List of Abbreviations

TRL Technology readiness level

PEDR Plan for Exploitation and Dissemination of Results

IPR Intellectual property rights

BMC Business Model Canvas

TMF Tailor made fertiliser

BBF Bio-based fertiliser

1. Introduction

1.1. The FERTIMANURE project

The use of manufactured fertilisers as a regular farming practice began in most EU countries in the mid to late nineteenth century but the greatest increase in consumption was after World War II. During 2015, the total amount of nitrogen and phosphorus mineral fertilisers used in EU-28 agriculture was 11.4 million tonnes (64 kg/ha) and 1.1 million tonnes (6.3 kg/ha) respectively. In the past, the production of mineral fertilisers from rock deposits (P) and based on fossil energy (N) have enabled food security and access to sufficient food for the World's growing global population. Nonetheless, the EIP-Agri emphasises that current dependency of EU agriculture on fossil-based mineral fertilisers must be regarded as a very serious threat to future food security.

FERTIMANURE opportunities are those that can offer real benefits and solutions to those facing current challenges related to inefficient use and management of animal manure. This project seeks to provide an innovative circular economy model to favour rural development in agricultural sector by creating real synergies and links within farmers and other industrial activities.

Benefits and **targeted solutions** in which **FERTIMANURE's** circular economy approach is based are:

- ✓ **Livestock sector**: Diversify the revenue sources. New farm activities bringing new business opportunities in the current fertilisers market.
- ✓ **Agricultural sector**: Well-defined and standardised fertilisers that will overcome the inherent variability residing in animal manure as feedstock, while achieving the same consistency in performance than conventional mineral fertilisers.
- ✓ **Chemical Industry**: Diversify nutrient sources to produce fertilizing products. On-farm and centralised Tailor-Made Fertilisers production.
- ✓ **Technology providers:** new market opportunities for technological companies providing efficient & effective technologies for nutrient recovery.
- ✓ **Society**: Alternative internal secondary nutrient sources that will, in the long-term, ensure food security and sustainable agriculture.

1.2. Scope and objectives of this deliverable

This deliverable is the last deliverable regarding the PEDR of the FERTIMANURE project. The previous reports were elaborated, updated and published in M16 and M32, and the last one at the end of the FERTIMANURE project (M54).

This first release included the formulation of the FERTIMANURE project Dissemination and Exploitation strategy and an action plan for activities concentrated on the first and second years (January 2020 – February 2022) of the FERTIMANURE project. Next was published at the beginning of the second year of the project including a detailed PEDR report of the Dissemination and Exploitation activities performed in the first two years of the project and an updated Dissemination and Exploitation plan for the rest of the project.

D6.8 FERTIMANURE plan for exploitation and dissemination of results includes the PEDR report for the entire project duration.

The Dissemination Plan for the FERTIMANURE project represents the strategic vision of the Consortium in terms of dissemination of the FERTIMANURE project itself and its achievements and outputs as well. Partner in charge of dissemination (GreenWin), lead the communication and dissemination activities whereas partners such as Fertilizers Europe (industries), European Landowners Association, or the French Chambers of Agriculture (Farmers and Policymakers) also have a key role in maximizing FERTIMANURE impact, acting as multiplier partners.

The **Exploitation Plan** is designed to multiply the impact of the proposed solutions and prepare the transition towards industrial and commercial uptake to fully achieve the expected impact. IPS, as the main expert in this regard in the consortium and leader of WP6 "Market potential, business plan, and exploitation, serves as the main contact and manager for this aspect of the project. Other FERTIMANURE partners with a key role in

exploitation are the industrial partners (or representatives thereof) AlgaEnergy, Fertinagro, AgriFutur, Cooperativa Plana de Vic, Fertilizers Europe, INTA and LEITAT Chile. Of course, other partners also have a role in the development of exploitation activities and plans, including the collection of data from farmers and the provision of data for the development of business plans and life cycle analyses, etc. During the project, several activities were carried out to prepare for the future industrial exploitation of the end-products obtained in FERTIMANURE.

Two different actors of the value chain, farmers and fertiliser companies, are envisaged as the main actors in exploiting the FERTIMANURE end-products. As both actors have different value propositions, two initial path-compatible business models have already been drafted following a CANVAS approach. Draft versions of business models were updated based on the collected input from FERTIMANURE stakeholders, and final versions were developed:

- 1 Business Model Canvas for the fertiliser industry
- 8 Business Model Canvases for farmers (for each consortium country)

In addition to a common exploitation plan developed within the project, all partners exploit individually their results during and will exploit after the end of the project.

2. Methodologies and Organisation

The methodology employed is mainly based on desk research techniques via literature review, partner's years of experience, and targeted discussion with experts.

FERTIMANURE partners are involved in several and relevant networks that will be used as lever to map and ensure successful outreach to relevant stakeholders. Moreover, we included “multipliers” as partners of the FERTIMANURE consortium: GreenWin, ELO and Fertilisers Europe, aiming to broad the contact with end-users and stakeholders. For example, GreenWin, as an industrial cluster active in green chemistry and industrial biotechnologies, have excellent connections with national and international clusters in their fields (sustainable chemistry, agro-industry and bio-based resource recovery respectively) and is also a member of EU networks and association, such as the BIC consortium and the Vanguard initiative Bioeconomy pilot. Also, Fertilisers Europe is a strong network representing most of the EU fertilisers sector, or ELO has also strong connections in the field of agriculture.

In addition, since the beginning of the project, FERTIMANURE became member of the European Sustainable Phosphorous Platform (ESPP), ESPP is particularly engaged in phosphorus recycling, addressing technologies, industrial implementation and regulation, safety and social acceptance of contaminants in recycled nutrient sources and agricultural value of recycled nutrient products.

Last, but not least, FERTIMANURE, together with the Biorefine Cluster Europe (coordinated by UGENT), has worked in the promotion and creation of the “European Sustainable Nutrient Initiative” (ESNI). ESNI aims to foster collaboration among European entities engaged in nutrient recycling, facilitating the exchange of valuable experiences and identifying knowledge gaps to guide future research. The ESNI Community is a platform that offers EU projects, companies, research institutes and experts the opportunity to share knowledge, achieve common objectives and raise their voice towards EU policy makers.

The following general subjects of dissemination have been identified: (I) FERTIMANURE project itself (general scope, coverage, goals and milestones and plans to reach them); (II) interim results (reached objectives and achievements); (iii) techniques and methodologies (in respect of IPR issues); (iv) technologies (in respect of industrial IPR issues); (v) sustainability assessment results; (vi) innovation aspects (in an “open innovation” perspective) and (vii) end – products (in respect of IPR issues).

3. Dissemination and Communication Plan

The main objective of the planned dissemination activities is to raise awareness and efficiently transfer knowledge of FERTIMANURE achievements to end users, industries and SMEs, the academic community and policymakers, to ensure replicability across Europe and CELAC countries. The FERTIMANURE project aims to provide innovative solutions for manure management that are ready to be applied and exploited to cover real needs.

Even though the project is mainly focused and designed to improve manure management and nutrient recycling in Europe, in the end, it is expected to obtain global solutions that could have a real impact worldwide. In that sense, special attention is put on how the project results can be exploited and replicated in the CELAC region.

Specifically, the FERTIMANURE project has worked on the following main dissemination activities:

- **Broadcast** FERTIMANURE scientific and technical results.
- **Push** exchange between the project and a wide range of stakeholders across the whole value chain.
- **Foster** exchange and knowledge transfer among the bio-economy stakeholders (academy and industry; farmers and rural community and industry; farmers and rural community and academy) and liaise with relevant initiatives to stimulate FERTIMANURE replication potential.
- **Interact** with end-users and outreach locations and attract investors (public & private) to enhance the commercial development of the project results.

The Consortium attaches great importance to dissemination. From the beginning of the project, all partners contributed and strived to maximize the use of all existing dissemination channels through websites, social media, leaflets and large audience publications (general press, industrial and agricultural magazines). The project and its results were presented at various conferences and fairs. All general communication materials are translated into all consortium languages to ensure a large broadcast and bring clear and accessible messages for all, avoiding technical jargon. Efficient outreach activities are based on an evolving dissemination strategy ensuring that the right messages are conveyed to the right stakeholders. As part of these activities, strong links are drawn with similar projects and initiatives in the EU through the already existing Biorefine cluster to build a strong network of relevant stakeholders. This network stays active and informed through ongoing engagement via regular communication channels (website, social media, publications) and, more importantly, through active participation in workshops, events, and webinars.

3.1. Dissemination Strategy

The objective of the dissemination strategy was to identify and organise the activities to maximize the influence of the project and to promote commercial and other exploitation of the project results.

In more detail, the objectives of the dissemination were:

i. To raise public awareness about the project, its expected results, and progress within defined target groups using effective communication means and tools;
ii. To exchange experience with projects and groups working in the field to join efforts, minimize duplication, and maximize potential;
iii. To disseminate the fundamental knowledge, the methodologies and technologies developed during the project;
iv. To pave the way for a successful commercial and non-commercial exploitation of the project outcomes.

The dissemination strategy and activities followed principles and best practices successfully tested by the partners in other projects and line with the EC guidelines for successful dissemination:

- All research results/reports were duly reviewed and a copy was sent to relevant partners involved in the project before publishing or disseminating. When appropriate, the reports refer to other research projects and build on the existing results and literature.
- Research was conducted following sound analysis and scientific practice principles, considering as much as possible policy requirements and needs.
- All partners who contributed to the project activities were duly informed about the outcomes and the implications stemming from project results.
- All public results were accessible from the project website and usable by all parties who may benefit from them.

A well-planned strategy for dissemination, exploitation and protection of results has been developed by highly considering FERTIMANURE project objectives, outputs and work plan. It is important to mention that all partners of the project have been actively involved in defining and following the PEDR, as it is a crucial document to ensure good project development. In case the FERTIMANURE project is funded, the PEDR presented in the following points (2.2.1 – 2.2.3), was annexed to the Grant Agreement and was a living document all along the project.

D7.1. Dissemination and Communication plan (DCP) is related to the PEDR but specifically addressed to communication activities and released in M6, this document aims to set up the objectives and the strategies that would be considered to manage the communication and dissemination activities during the lifetime of the project. During the project's lifetime, into account was taken possibility of changes regarding the interest of the potential stakeholders, which was able to bring as a result a close review and a regular update of this Plan. The procedures and objectives were continuously evaluated to achieve the maximum impact so that the initial Plan could undergo some changes during the project.

3.1.1. Subject of dissemination

The following general subjects of dissemination have been identified:

- FERTIMANURE project itself (general scope, coverage, goals and milestones and plans to reach them)
- Interim results (reached objectives and achievements)
- Techniques and methodologies (respecting IPR issues)
- Technologies (respecting industrial IPR issues)
- Sustainability assessment results
- Innovation aspects (in an "open innovation" perspective)
- End–products (respecting IPR issues)

3.1.2. Target Audience

The overall aim was to maximize the utilization of the dissemination potential of the FERTIMANURE consortium. Dissemination activities had to be tailored in such a way as to reach the audiences most efficiently through appropriately selected dissemination channels and dissemination tools.

To convey the right message to the right stakeholders, the most appropriate channels had to be used. The **FERTIMANURE audience was manifold:**

- **Key agriculture and industry players**: Livestock farmers, fertilisers (manufacturers & sellers) and the chemical industry were updated on the applications that can be made of manure as well as the exploitation and replication possibilities of the project results. Arable farmers, crop growers and producers were sensitive to the use of alternatives to conventional fertilisers.

- **Research and education community**: Research institutions, relevant EU projects and networks, in particular the Nutrient recovery community, received updates about the technical and scientific project progress.
- **Policy makers and authorities:** Public procurers, local council and regional government of the region involved in the partnerships and National and European-level policymakers were awakened to their driver role in the market uptake of bio-based products.
- **Investors in bioeconomy:** Public and private investors were informed about the exploitation opportunities and possible commercial development of FERTIMANURE.
- **Industry of equipment supply:** Contact with an industry that is interested in proposing new mature technologies to answer challenges of the Circular economy allowing future development of FERTIMANURE technologies in the real economy.
  Rural communities and society: Engaging with the general public and rural communities promoted the environmental and health benefits of biofertilisers. The idea was to raise public awareness of the necessity of a transition towards a greener economy as well as the advocacy role the public can play in boosting the EU bioeconomy.

A detailed stakeholder analysis (WP6) was carried out to comprehensively understand and segment the FERTIMANURE audience. Performed analysis was the basis for designing an evolving dissemination and communication plan (WP7) to determine the best possible channels to deliver target-specific key messages and eventually set the base for the targeted value chain involvement and business case development.

In the context of a project, stakeholders were individuals and groups that were affected by the project and project results. It is extremely important not only to know which positive changes the project achieved but also what stakeholder groups experienced these positive (or negative) changes. Therefore, project goals and results had to be intended for stakeholders. Within the project, 6 stakeholder's groups were identified. Methodology for stakeholder group is covered within **D 6.3 Inventory of stakeholder groups relevant for BBFs and market uptake.**

Table 1. The stakeholder groups identified within the FERTIMANURE project

	**STAKEHOLDER GROUP 1 (SG1)**	**agricultural producers**	1) livestock farmers 2) arable farmers, crop growers 3) agro SME´s 4) agro associations 5) sustainable agriculture associations
	**STAKEHOLDER GROUP 2 (SG2)**	**fertilisers processing industry**	1) Fertiliser companies (manufacturers and sellers, both mineral and organic) 2) chemical industry 3) manure processors 4) public investors in bioeconomy 5) private investors in bioeconomy 6) technology providers 7) fertiliser association
	**STAKEHOLDER GROUP 3 (SG3)**	**academia and research**	1) research institutions 2) EU subject related networks and clusters (agro - industry, sustainable chemistry) 3) EU R&D neighbouring projects and consortiums 4) nutrient recycling research community

	**STAKEHOLDER GROUP 4 (SG4)**	**business and financial advisors**	1) business consultants 2) financial institutions 3) agricultural banks 4) funding agencies
	**STAKEHOLDER GROUP 5 (SG5)**	**policy makers & authorities**	1) ministries of agriculture 2) paying agencies for agriculture 3) agro-connected intermediaries established by government (extension service, LAGs) 4) local council 5) regional government 6) waterboards 7) standardization body 8) EU policy makers 9) CELAC policy maker
	**STAKEHOLDER GROUP 6 (SG6)**	**public entities & general public**	1) non- governmental organisations 2) media 3) general public – rural communities

The following table (Table 2) presents an overview of Key Performance Indicators (KPIs) designed to efficiently measure the impact of FERTIMANURE dissemination activities. These KPIs are instrumental in assessing the effectiveness and reach of dissemination efforts, facilitating informed decision-making and continual improvement in promoting sustainable agricultural practices. The Table also summarises the achievement of the different KPIs set at the beginning of the project.

Table 1. Overview of KPIs to efficiently measure the impact of FERTIMANURE dissemination activities

What was expected?				What did we achieve in the project?		
KPI	**Value**	**Description**	**KPI - goals**	**KPI - achieved**	**The number of stakeholders reached**	**Short description**
Presentations of results at conferences and fairs	Up to 20	Presentation of project results in key sectorial fairs and conferences.	The objective of the KPI is to maximise the dissemination of results, new policies and good practices.to relevant stakeholders.	88 presentations in conferences and events. See annex III	More than 14000 stakeholders reached during events / workshop and international fairs.	88 event / conferences in total.
Scientific or technical publications	Up to 10	Scientific/technical publications regarding FERTIMANURE's new processes, technologies and obtained BBF.	The number of scientific publications depends mainly on the information that is made available considering that there would be information that will be protected, thus not published in the scientific journals. GreenWin has contacted partners monthly for feedback.	15 publications in scientific journals	*Some articles published have already citations.* *Publication 1 : 31 readers and 9 citations* *Publication 3 : 3 readers and 1 citations* *Publication 6 : 6 readers and 1 citation*	The FERTIMANURE partners have produced 15 publications that have been submitted in relevant scientific journals. Other papers are being produced, so it is expected that this number will be higher after the end of the project.
Large scale events	4	4 events organised in The Netherlands, Argentina (CELAC region) and 2 in Belgium, targeting more than 100 attendees, aiming to engage stakeholders and share knowledge and best practices.	It is expected that at least 100 relevant stakeholders attend these events.	5 large-scale events organised	570 stakeholders reached. Number of attendees per event: First - 50 Second - 100 Third - 100 Fourth – 120 Fifth - 200	First large-scale event took place in Den Bosch (NL) in the ManuREsource conference in November 2021. Second one took place in Argentina in March 2023. Third one was during the Ecomondo Event in Italy (November 2023) Fourth one - Final Fertimanure Event in Brussels – NERM Event (April 2024).

						Fifth one – Final FERTIMANURE event in Spain – PRO-FEM event (May 2024)
Local stakeholder engagement	In the range of 2 brainstorm session per country and 8 demo days	Organisation of 2 brainstorm session per participating country to better understand the ever-changing business environment around bio-based value chains and products. Furthermore, 8 demo days were organised	16 brainstorm sessions 8 demo days, 2 in each of the countries were field trials where performed	2 brainstorm session per participating country 8 demo days, 2 in each of the countries were field trials were performed	641 stakeholders via brainstorm sessions 760 stakeholders via the demo days	As the market heads into a scenario that has many companies at play, formation of good, long-term relationships with end users has become a key imperative. It is crucial to understand needs of customers which was achieved via organisation of a brainstorm session. Brainstorm sessions included different stakeholders (*research institutions, external sector related parties, agricultural producers, business chambers etc*.) and went step further in catalysing the list of barriers and opportunities currently present at the market.

Policymakers outreach	1 workshop, 2 round tables	Number of authorities directly involved and engaged in the FERTIMANURE pilots	1 policy workshop (online), 2 round tables (in person)	1 policy workshop (online), 2 round tables (in person) and 4 position papers prepared	52 attendees in total (workshop and 2 round tables) Position papers shared with more than 20 policy makers	The organised events aimed to provide a platform for stakeholders to share their views on the market opportunities for technologies and products developed within the project. Participants also discussed how subsidies could help in the production or application of BBFs at the EU level. Online workshop – (November 2023) Round tables – (March 2024) 4 position papers prepared and shared with policy makers at national and EU level, two of them jointly prepared with the RUR08 sister projects.
Advisory Board Meetings	4	Number of meetings with the Advisory Board Members (1 per year).	1 per year (total 4)	3 Advisory Board meetings	Not applicable	3 AB meetings organised on 28-29/04/2021 14/10/2022 21/02/2024
Workshops/seminars (including webinars)	6	Workshops targeting farmers, scientific community and policy makers will be organized for closer interaction with stakeholders.	6 workshops/seminars	15 workshops / webinars organised.	Total of attendees: 771	Mainly reached stakeholders from group 1 and 2 then 3 and 5.

3.1.3. Communication activities

The overall objective of the communication activities was to ensure the successful outreach of the FERTIMANURE project vision to the public and society. Through these activities, general awareness about the project, its impacts, and its benefits to all stakeholders was raised. Additionally, the aim was to publicize the benefits of the EU circular bioeconomy, as well as the sustainable development of rural activities in Europe.

FERTIMANURE Communication plan

The communication and dissemination plan was initially developed in M6 and then revised in January 2022. The aim of the communication plan was to develop the communication strategy and define the tools needed to communicate effectively with different audiences during the life of the project. It was also considered the possibility of changes in the interest of potential stakeholders, which led to the plan being scrutinised and updated on a regular basis. Procedures, objectives and communication tools were continuously evaluated to achieve maximum impact, so the original plan may have undergone some modification during the course of the project.

Table 3. Communication plan

Communication Measures	Scope	Target Audience
Visual identity	Build a strong identity for FERTIMANURE through branding	All stakeholders
Project website (www.fertimanure.eu)	Share general project information, main public deliverables and also promote events, workshops and all other organized activities.	All stakeholders
Social Media	Create Twitter and LinkedIn accounts to share posts and relevant information of FERTIMANURE progress	All stakeholders
Leaflets and posters	Give visibility of FERTIMANURE to internal and external events, conferences and other activities	Academic & research; fertilisers & chemical industry; farmers; public authorities & policy makers
Biannual newsletter	Share main project information/results and update about project progress	Academic & research; fertilisers & chemical industry; farmers; public authorities & policy makers
Press releases		Society
large-audience vulgarizer video	Raise awareness	Society

FERTIMANURE communication activities

The communication activities of the FERTIMANURE project took place through the following activities/channels: Branding / Website / Social networks / Videos / newsletters / press releases / EIP Practice abstracts / Roll-up-Folders and Posters. We have developed and used as many communication materials and channels as possible to achieve our dissemination objectives.

Table 4. Achievement of Communication activities

Branding	A strong single brand has been created for the project. Branding activities included designing a logo, a common email signatures for all partners, common PowerPoint template to be used for all project-related presentation.
Social networks	Social media pages LinkedIn and Facebook have been set-up to showcase the project and update on its results. Partners were also engaged to share the FERTIMANURE posts and news on their personal and/or institution social media pages and website.
Website	Website (www.fertimanure.eu); available in English and Spanish to inform on the project and its main achievements.
Leaflets / Posters and roll up	A first leaflet was produced in English and Spanish in M6 when the project started and it included general information about the project like the objectives, the expected impacts, the outputs, the partners, the value of the project, etc. A second leaflet was also produced for the final event of FERTIMANURE in Brussels. In this case, the final leaflet included a summary of the main project outcomes. Roll up and posters: During the duration of the project different roll up and posters have been produced to give visibility to FERTIMANURE during events and conferences.
Videos	A specific FERTIMANURE YouTube channel has been created. Initially, only a FERTIMANURE general video was foreseen. However, at the end, the project has also produced a video explaining 4 of the 5 on-farm pilots: Spanish pilot, Dutch pilot, Belgian pilot and German pilot. Moreover, the general project video of the project has also been translated to all the partners languages.
Press release	2 press releases have been produced to participate to the dissemination of the project. Specialized and non-specialized journalists have been identified. They are the ones that interest the project most since we wanted to reach out to the targeted audience. All the project partners were involved in creating the content and also to establish a common list of journalists. The press releases have been sent to 49 European journalists
Newsletters	6 Newsletters have been produced and distributed to 230 stakeholders/ newsletter during the project.

The dissemination of the FERTIMANURE's results was done through the following communication activities:

- EIP Practice abstracts
- Scientific publications
- Attendance to main events / conferences and webinars organisation
- Intermediate events
- On-farm experimental pilot visits
- Final Event

EIP Practice abstracts

The EIP-practice abstracts were an excellent way to ensure the uptake of results by farmers. Initially, it was foreseen that FERITMANURE would produce 12 Practice Abstracts, but finally, we produced a total of 15, which are listed below:

- Practice Abstract 1 - H2020 FERTIMANURE project objectives
- Practice Abstract 2 - Changes to the EU fertiliser regulation will allow for harmonization of criteria for organic materials for fertilising purposes (including BBFs) across the Member States
- Practice Abstract 3 - Innovative on-farm pilots to recover nutrients from manure Short summary
- Practice Abstract 4 - Existing nutrient imbalances in European regions
- Practice Abstract 5 - Manure valorisation at the on-farm Belgian pilot plant

- Practice Abstract 6 - Manure valorisation at the on-farm Dutch pilot plant
- Practice Abstract 7 - SWOT analysis of BBFs produced in the project framework
- Practice Abstract 8 - Agronomic performance of BBFs
- Practice Abstract 9 - The results of on-farm TMFs production
- Practice Abstract 10 - The successful business case in the Arjan Prinsen farm (The Netherlands)
- Practice Abstract 11 - FERTIMANURE Business plans and business models for sustainable manure management
- Practice Abstract 12 - FERTIMANURE TMF Nutrition Tool
- Practice Abstract 13 - Sustainability of the FERTIMANURE solutions and Decision Support System Practice Abstract 14 - FERTIMANURE Regulatory Tool
- Practice Abstract 15 - FERTIMANURE BBFs in the context of organic farming

The Practice Abstracts were prepared following the EIP-Agri guidelines and were also translated to all partner languages to easily reach the farmers from each region.

Publications

The industrial and academic partners, individually and in collaboration, published and presented scientific advances in technical papers as well as in journals (peer-reviewed or not) and magazines. Scientific publications are an effective way to disseminate high-level project information and to attract the interest of representatives of the various target groups. Publications in specialised magazines and papers sent to related events attract the attention of technicians and researchers as well as allow collaboration within the purposes of the FERTIMANURE. To support this activity, whenever possible, project publications were archived or linked on the FERTIMANURE website.

In Annex I, the FERTIMANURE consortium had to prepare a list of planned articles for scientific journals, and in Annex II, a list of planned articles for magazines and sectorial publications.

Target Conferences and Events

The FERTIMANURE promoted the project in different conferences and event targeting relevant domains for the project. The impact of presentations at this kind of events was very high because of the attendance of scientists and industrial experts. National and international conferences were an excellent opportunity to share the results with experts in the field and, therefore, to achieve an effective dissemination of the project. Workshops, meetings and other large events (exhibitions, trade fairs, showcases) represent relevant opportunities for dissemination. The goal of these events was to disseminate both the techniques developed during the project and the preliminary results of the project to the targeted beneficiaries of the FERTIMANURE project.

Annex III is presenting a table showing all conferences and events attended by the partners throughout the duration of the project. We took part in no fewer than 88 events, some as organisers, others as participants and/or speakers. During these events, we were able to talk about the project and ensure its visibility and later results through speeches, posters and roll-ups.

If we add up all the participants, we can say that we were able to reach around 14.000 people. The events attended included both, virtual and face-to-face participation and both workshops/conferences or events.

In terms of stakeholders reached, we can confirm that the 6 groups identified at the start of the project have been reached. Some events / workshops were more focused on end-users, others on Academia and researchers and / or public authorites / investors and policy makers.

3.1.3 Dissemination management

3.1.3.1. Distribution of responsibilities

According to Article 29.1 of the Grant Agreement, unless it goes against their legitimate interests, each beneficiary had to — as soon as possible — ‘disseminate’ its results by disclosing them to the public by appropriate means (other than those resulting from protecting or exploiting the results), including in scientific publications (in any medium).

All partners of the consortium had to contribute to the dissemination according to their foreseen role and effort and using all available tools. By participating and giving presentations at conferences, publishing papers, holding press conferences, networking and similar activities and partners maximized the existing dissemination channels for project result adoption and successful future commercialization of FERTIMANURE outputs.

GreenWin was the responsible partner for external communication.

3.1.3.2. Dissemination policy and rules

On one hand, the **FERTIMANURE Data Management Plan (D8.2)** describes the obligations for dissemination, including requirements such as the showcasing of the European Union Banner and Funding phrase. Partners had prepared FERTIMANURE templates for presentations, rollups, etc. In general, main communication materials were created or supervised by the Communication leader (GreenWin) with revision by the Project Coordinator and WP leaders as necessary.

Regarding the issue of intellectual property (IP), if the rules of protection of data in D8.2 are respected, there should be no issues or impacts from the dissemination or results on rights protection.

The basic regulation of the dissemination activities in the CA states that:

Results were owned by the Party that generates them. Ownership of the Results shall be governed by the provisions of Sections 26.1 and 26.2 of the Grant Agreement. Where Results are generated from work carried out jointly by two or more Parties and it is not possible to separate such joint invention, design or work to apply for, obtain and/or maintain the relevant patent protection or any other intellectual property right, the Parties shall have joint ownership of this work. As such, dissemination of results should also reflect the ownership of those results, i.e., dissemination activities should adequately reflect the participation of any parties having participated in the generation of those results. During the Project and for 1 year after the end of the Project, the dissemination of own Results by one or several Parties including but not restricted to publications and presentations, shall be governed by the procedure of Article 29.1 of the Grant Agreement. Prior notice of any planned publication shall be given to the other Parties at least 45 calendar days before the publication. Any objection to the planned publication shall be made by the Grant Agreement in writing to the coordinator and to the Party or Parties proposing the dissemination within 30 calendar days after receipt of the notice. If no objection is made within the time limit stated above, the publication is permitted.

3.1.3.3. Dissemination monitoring and reporting

All consortium partners were encouraged by the partner responsible for dissemination **to report the results of each dissemination activity immediately after they were presented**. The reports included feedback gathered by the respective partners from the target audience (if it was applicable).

For monitoring purposes, the dissemination activities were reassessed regularly and conveyed to the Project Technical Committee by GreenWin during the project progress meetings that took place every month during the project lifetime.

The Final Report to be delivered to the EC at the end of the project includes the final PEDR compiled by GreenWin and the contributions of UVIC and IPS based on the contributions of all partners.

Finally, the Deliverable **D7.5. Dissemination Reports** include a summary of all the dissemination and communication activities performed in the FERTIMANURE. The final version of this report will be submitted in Month 54.

3.1.3.4. Evaluation

For the evaluation of FERTIMANURE dissemination activities, quantitative indicators and associated metrics were set up where applicable. The following table shows a summary of Communication Key Performance Indicators (refer to **D7.1. Communication and Dissemination Plan**).

Table 5. Summary of Communication Key Performance Indicators

Communication tool	Key performance indicator	Achieved KPI	Target audience	Short description
Website	8,000 visits by project end	KPI achieved. Since the project website is online (M6) until May 31, 2024 the website has received More than 15.000 visits. The last year of the project (Mai 23 to Mai 24) we had around 250 visitors/months	Stakeholder group concerned: SG1 Agricultural producers SG2 Fertilisers processing industry SG6 Public entities and General public	Once the website has been launched we reached up to 732 visitors/Month. (8793 visitors only during the first year) The last year of the project (May 23 to May 24) we had around 250 visitors/months which is a very good result bearing in mind that the project was known and had been under way since 2020.
Twitter, Facebook and LinkedIn	400 followers	KPI achieved. LinkedIn: 759 followers Facebook: 106 followers X (Twitter): 395 followers	Stakeholder group concerned: SG1 Agricultural producers SG2 Fertilisers processing industry SG6 Public entities and General public	LinkedIn is a professional platform and it's also the most effective platform when it comes to delivering content and securing audience engagement. This explains why we have more followers on LinkedIn than on X and Facebook.
Leaflet	1,000 leaflets distributed	KPI achieved. 2 leaflets developed and printed. More than 1.000 leaflets printed and distributed in the different workshops and events.	Stakeholder group concerned: SG1 Agricultural producers SG2 Fertilisers and processing industry SG3 Academia and research SG4 Business and financial advisors SG5 Policy makers and authorities SG6 Public entities and general public	2 leaflets have been developed and printed: one at the beginning of the project to present the project and a second to present the results of the project.

Poster	Displayed > 30 times	KPI partially achieved. Partners reported the presentation of 6 posters in conferences.	Stakeholder group concerned: SG1 Agricultural producers SG2 Fertilisers and processing industry SG3 Academia and research SG4 Business and financial advisors SG5 Policy makers and authorities SG6 Public entities and general public	6 reported posters. See table annex IV.
Roll-up	Displayed > 30 times	KPI achieved. 39 time displayed See Annex III	Stakeholder group concerned: SG1 Agricultural producers SG2 Fertilisers and processing industry SG3 Academia and research SG4 Business and financial advisors SG5 Policy makers and authorities SG6 Public entities and general public	For each face-to-face events (fairs/workshop/conference) FERTIMANURE roll-up was exposed.
Video	1,000 views by end of project	KPI achieved 3683 views considering the different videos published	Stakeholder group concerned: SG1 Agricultural producers SG2 Fertilisers and processing industry SG3 Academia and research SG4 Business and financial advisors SG5 Policy makers and authorities SG6 Public entities and general public	A total of 6 videos have been produced, including the general explanatory video of the project, which was translated to the different partners languages, and also 4 videos of different on-farm pilots: Spanish, Dutch, Belgian and German. A closing video has been produced end of June. In total with the translations we have 17 videos
Newsletter	400 readers reached by the end of the project	KPI achieved. 6 newsletters produced and sent to 230 people with an open rate of 50% (690 reads of FERTIMANURE newsletter)	Stakeholder group concerned: SG1 Agricultural producers SG2 Fertilisers and processing industry SG3 Academia and research G6 Public entities and general public	Fertimanure's mailing list contains 230 emails and have an open rate of 50 %.

4. Impact and Exploitation Plan

4.1. Innovation Potential of FERTIMANURE

It is estimated that the total farm livestock population in Europe excretes around 1400 million tonnes (Mte) of manure annually, representing the largest waste stream with valorisation potential for the production of fertilisers from organic origin. From this, just a relatively small proportion is currently being valorised (energy, fertilisers). The FERTIMANURE project provides innovative nutrient management solutions to finally reach a circular economy model to favour rural development in the agricultural sector. Two initial business models were developed at the beginning of the project, one targeting the farming sector and another focusing on fertilisers companies, to take advantage of the opportunities identified by several EU initiatives (EU Circular Economy Action Plan, Common Agricultural Policy, New EU Fertilizers Regulation (which replaced EC No. 2003/2003), etc.).

Achieved results of the project and consistent communication with the relevant stakeholders provided a preparation of:

- 1 Business Model Canvas for the fertiliser industry
- 8 Business Model Canvas for farmers (for each consortium country)

What were the specific types of innovative impacts of the FERTIMANURE?

- FERTIMANURE was distinguished by its use of **innovative technologies** for the treatment of manure and recovery of useful matter and nutrients. On one hand, the project incorporates individual technologies that have not been widely accepted on the market, have been recently patented, or are still under development. Furthermore, the five pilot plants were notable for the combination of different innovative technologies along the processing chain to achieve high efficiencies in nutrient separation and recovery. More specifically:

    - In the Spanish pilot, the main innovations were the implementation of membrane contactors for N recovery (gas and liquid), freeze concentration, the production of biostimulants from microalgae and the valorisation of the solid fraction and P-recovery using biodrying coupled to thermal treatments.
    - In the Dutch, pilot, the main innovations were the inclusion of a combined biological acidification plus phosphorus recovery system and the nitrogen recovery from the acidified liquid fraction.
    - In the German pilot, the main innovations for the pilot were the ammonium binding to minimise the nitrogen “leak” into the gas phase and acid scrubber; the catalytic reforming of the manure with zeolite; the selective ammonium recovery directly from the TCR-gas stream; the phosphoric acid leaching of the TCR-biochar and the exchange reaction to produce solid ammonium phosphate ready for application in a decentralised unit.
    - In the Belgian pilot, the main innovations were the market uptake of secondary ammonium sources obtained from on-farm decentralised stripping/scrubbing technologies. Mainly (i) the use of ammonium sources from farms in centralised chemical processing facilities, (ii) the use of alternative counter-acids in acid scrubbing operations, (iii) product delivery, dried granulates vs liquid and (iv) logistics & economics of centralised upcycling scrubber waters.
    - In the French Pilot, the main innovations were (1) to propose these technologies (pyrolysis, and striping - after methanisation or not) in a mobile unit to test them on farm on variety of manures and slurries existing in real farm environments (2) to estimate both agronomic values of fertilisers and soil improvers produced and indication on reduction of non-desired compounds (with a specific focus on pathogens reductions from poultry manure by pyrolysis) (3) to measure interest of farmers for these new technologies on one hand and, on the other hand, for a mobile service proposing these technologies so that interested farmers could use

them even if their manures and slurries production are not sufficient to justify investing money and time in such equipment.

- FERTIMANURE created a suite of highly **innovative fertilising products**, the so-called **tailor-made fertilisers (TMFs)**, whose objective and innovative nature is that they are designed and produced for specific crops to satisfy individual crop needs. This is in line with more efficient and adequate fertilisation demanded by society, accompanied by integral fertilisation programs which promote a more sustainable agricultural model and the rural circular economy. The FERTIMANURE project generated 44 TMFs for 44 soil-crop combinations with different N, P, K and S recommendations.

- With the above technological innovations, FERTIMANURE paves the way for the propagation of sustainable manure management and fertilisation with the development of **innovative business models**. On one hand, a business model for farmers was developed, based on the production of high-quality fertilising products which can either be used directly on the farm or sold to fertiliser companies to produce TMFs. On the other hand, two value propositions are defined for fertiliser companies. On one hand, fertiliser companies need to diversify their source of nutrients to produce their TMF, therefore they will produce biobased TMF from secondary renewal resources. On the other side, in mixed farming systems, a new model was proposed in which TMF are directly produced on-farm and the fertiliser companies sell to farmers the supplements/additives to produce these TMF. Depending on the value proposition, farmers act as suppliers or customers of the fertiliser companies.

End-user's accurate knowledge of eco-friendly and economic viability of end-products produced, encouraging acceptance, was the linchpin to the market uptake of BBFs. FERTIMANURE was developed considering the end user's acceptance and requirements as a key challenge to be addressed from the early beginning. To enhance the acceptance and to facilitate the decision-making process of farmers, a Decision Support System was developed integrating all generated knowledge taking into account environmental, technical, economic and policy aspects. This DSS provide information on: (i) WHICH end-products to produce, (ii) HOW to produce them (BBF vs TMF, on-farm vs centralized) and (iii) WHEN and WHERE to use them (better fertilisation strategies).

4.2. Socio-economic impacts of FERTIMANURE

In 2017/18, global fertiliser consumption increased moderately by 0.9 %, reaching an estimated 187 million tons (Mt) of nutrients. By 2022/23, it was expected that global fertiliser demand will be just below 200 Mt. The EU inorganic fertiliser market, which makes up 8 0% of the total, is estimated at 16 million tons of nutrients per year, accounting for about 9 % of the world's consumption, according to the International Fertiliser Association (IFA).

Fertilisers Europe estimates the annual market size of European inorganic fertilisers as follows:

- Nitrogen (N): 10.368 Mt
- Phosphorus pentoxide (P2O5): 2.408 Mt
- Potassium oxide (K2O): 2.704 Mt

Global demand is forecasted to grow fastest for potassium (1.8 % per year), followed by phosphorus (1.4 % per year) and nitrogen (1.0 % per year), driven by improvements in nitrogen management practices and more balanced fertilization in some regions.

Inorganic fertiliser manufacturing plants are spread throughout Europe, with France, the Netherlands, Germany, Poland, and Spain being major producers. Globally, the production of inorganic nitrogen fertilisers is concentrated in Russia (20 %), the United States (19 %), and Canada (6 %). Morocco, China, and the US hold two-thirds of the world's phosphate rock reserves.

In 2017, the world fertiliser market was relatively weak, leading to poor margins for the industry due to low demand and plentiful supply. According to Eurostat, the EU fertilising product market is a significant economic sector with an annual turnover of 20 to 25 billion EUR, employing around 95,000 to 100,000 people. This

represents approximately 1 % of the EU's Gross Value Added for the entire manufacturing sector and 0.2-0.3 % of the manufacturing workforce.

Recent events, such as the Russia-Ukraine conflict and previous global disruptions, have significantly impacted vital sectors like food crops and fertiliser production and trade. Fertiliser prices, already historically high, surged since late 2020 due to factors including the rebound from COVID-19 lockdowns, shipping disruptions, and increased natural gas and fuel costs. This situation has raised fears of a fertiliser shortfall, prompting import-dependent countries to seek alternatives in a tight global market. With about three-quarters of nations importing over 50 % of their fertilisers, trade shocks have heightened global concerns about food security.

Despite a persistent decline in fertiliser prices since early 2022, the current situation remains uncertain and like pre-2020 conditions. Europe heavily relies on importing large quantities of natural gas to manufacture nitrogen fertilisers and nearly all its phosphate rock from limited global reserves to produce phosphate fertilisers. This underscores the urgent need for nutrient recycling from waste streams and the production of economically viable BBFs. The fluctuating and unpredictable nature of fertiliser prices adds complexity to the challenges faced by both mineral and BBFs in the current market conditions.

Within the project, 8 business plans for the end-products produced (mineral, organic amendments and biostimulants) are developed to ensure short-term exploitation and market uptake. In that sense, it is important to mention that the main fertilisers companies in the FERTIMANURE consortium are expecting a total turnover increase in the short term of more than 10 million EUR thanks to the FERTIMANURE project outputs.

4.3. Environmental impacts

The Farm to Fork Strategy is a big part of the European Green Deal which aims to improve the well-being and health of the current citizens and future generations by transforming the EU into a modern, resource-efficient and economy. The Farm to Fork Strategy aims to accelerate the transition to a sustainable food system and to make food systems fair, healthy and environmentally friendly. The Farm to Fork Strategy aims to make sure Europeans get healthy, affordable, and sustainable food, tackle climate change, protect the environment and preserve biodiversity and increase organic farming.

The FERTIMANURE aims to recover mineral nutrients, biostimulants and organic matter from animal manure and obtain BBFs and TMFs. The developed end-products were evaluated under the organic farming regulatory framework and underwent an assessment of their sustainability and acceptability in organic farming. This will be beneficial for farmers facing challenges related to inefficient use and management of animal manure and target solutions to contribute to the long-term sustainability of production agricultural which is in line with the goals of the Farm to Fork Strategy.

Furthermore, FERTIMANURE is in line with the Green Deal strategy that should lead to the use of sustainable practices, such as precision agriculture, organic farming, agro-ecology, agro-forestry, and stricter animal welfare standards. Measures, such as eco-schemes, should reward farmers for improved environmental and climate performance, including managing and storing carbon in the soil and improved nutrient management to improve water quality and reduce emissions. Green Deal also needs to reflect an increased level of ambition to significantly reduce the use and risk of chemical pesticides, as well as the use of fertilisers and antibiotics. The area under organic farming also needs to increase in Europe. The EU needs to consider the potential role of new innovative techniques to improve the sustainability of the food system while ensuring that they are safe.

Most of the nutrients in manure are being returned to agricultural land with little or no processing favouring, in that way, N leakage. The main pathways for nitrogen leakage from agriculture are nitrate leaching to ground and surface waters (43 %), denitrification (conversion to N_2 gas) (30 %) and ammonia emissions (23 %). Manure handling and application results in large amounts of nutrient losses (calculated to exceed 6 Mt N per annum) through gas emissions, leaching and runoff. Essentially, these values show that a significant proportion of nitrogen escapes as gases to the atmosphere, and most of the rest is leached into groundwater, waterways, and ultimately to seas and oceans. In soils, excess P build-up can lead to increased phosphorus losses through runoff and soil erosion. P and N in waters contribute to eutrophication, reducing water quality, aquatic

biodiversity and increasing greenhouse gas emissions. In the atmosphere, nitrogen oxides and ammonia reduce air quality, contribute to atmospheric deposition and have a strong impact on human health.

FERTIMANURE contributed significantly towards a situation where the optimal application of manure with minimal loss of nutrients can be achieved in all regions. For example, the use of biostimulants can increase fertiliser efficiency by 5-25 %. A 5 % improvement across the EU would mean 550,000 fewer tonnes of N lost to the environment per year. That would mean cost savings to EU farmers of € 165M annually (assuming an average price of € 300/t N) improving farm profitability and competitiveness. The following table shows the current environmental impacts generated due to the loss of 6 Mt of N and the expected decrease in these impacts in the mid-term and long-term after the implementation of FERTIMAMURE Nutrient Management strategies.

Table 6. Estimated environmental impacts generated by N losses from manure management and application

	Current Scenario (impacts per year)	Mid-term scenario (Reduction up to 15%)	Long-term Scenario (reduction up to 50%)
Global Warming Potential (kg CO2eq/year)	2.25E+10	1.97E+10	1.12E+10
Marine Eutrophication (mol Neq/year)	1.61E+05	1.41E+05	8.05E+04
Terrestrial Eutrophication (mol Neq/year)	3.64E+08	3.18E+08	1.82E+08
Particulate Matter Formation (DI, x10-2/year)	1.38E+02	1.21E+02	6.92E+01
Photochemical Ozone Formation (kg NMVOCeq/year)	8.48E+07	7.42E+07	4.24E+07

These calculations do not include the avoided environmental impacts of mineral fertiliser substitution, therefore even better results were achieved. Environmental impacts have been calculated by using the EMEP/EEA models to determine the fate of N in the different environmental compartments (e.g., NH_3 to air and NO_3^- to water bodies) and considering emission factors provided by the European Platform on LCA. Ammonia emissions contribute to the formation of particulate aerosols in the atmosphere. The reduction in NH_3 emissions due to better use of nutrients in manure will help to address air quality issues, as exposure to particles has negative effects on human health. Health effects may include cardiovascular effects such as cardiac arrhythmias and heart attacks and respiratory effects such as asthma attacks and bronchitis. The production of mineral fertilisers requires the use of non-renewable resources – mineral deposits and/or (fossil) energy. Nitrogen (N) production requires large amounts of natural gas to transform nitrogen from air into forms that can be used by plants. The EU N fertiliser industry is an energy-intensive industry and contributes directly and indirectly to GHG emissions. FERTIMANURE sustainable production of N-fertilisers from animal manure contributed to the challenging EU 2030 framework for climate and energy policies. The following table shows the global warming potential related to the production of the main N and P conventional mineral fertilisers currently used and the expected avoided impacts in the mid-term and long-term after the FERTIMANURE implementation. Better use of nutrients contained in manure will imply a reduced need to produce conventional fertilisers.

Table 7. Estimated reduction of CO2 emissions thanks to the partial replacement of mineral fertilisers

	Global Warming* kg CO2eq/t	Current EU27 use of fertilizers Mt/year	Estimated rate of substitution (mid-term) Mt/year	Estimated rate of substitution (long-term) Mt/year	Avoided impacts mid-term t CO2eq/t	Avoided impacts long-term t CO2eq/t

Ammonium nitrate	4148	2.6	0.285	1.14	1182	4729
Calcium ammonium nitrate	4608	2.1	0.225	0.9	1037	4147
Urea	3983	1.9	0.5025	0.81	807	3226
Ammonium phosphate	1249	0.7	0.07	0.15	87	187
Total reduction of GHG (t CO2eq/year)					3113	12290

* Values extracted from the EF-compliant datasets from Product Environmental Footprint Agro-Food database

4.4. Exploitation of FERTIMANURE results

The exploitation plan is designed to multiply the impact of the proposed solutions and prepare the transition towards industrial and commercial uptake to fully achieve the expected impact. The EP describes the activities to be undertaken (how and by whom) to ensure the exploitation beyond the project itself.

The exploitation strategy reflected and was built up because of a sound analysis of the market trends (WP6), potential users and financial sustainability.

All partners of FERTIMANURE were interested in the results of exploitation in different manners. Research partners were more oriented to transfer knowledge and technology to interested stakeholders while the industries were strongly focused on industrialization and future commercialization of the research products. During the project, several activities were carried out to prepare for the future industrial exploitation of the end-products obtained in FERTIMANURE. Two different actors of the value chain, farmers and fertiliser companies, are envisaged as the main actors to exploit the FERTIMANURE end-products; as both actors have different value propositions, two initial path-compatible business models have already been drafted following a CANVAS approach.

According to the Grant Agreement, Industrial exploitation in the EU had to be centred on industrial exploitation and replicability from Month 36 to Month 54. The primary objective was to ensure that the data acquired during the project's lifespan supported industrial exploitation and replicability and it was performed by partner – Fertilizer Europe. The main objective was to collect impressions and feedbacks on how the results obtained could benefit from policies in place, how policies could be modified to promote the accessibility and use of BBFs and the scalability of the processes studied. In order to achieve the objectives of this study, a comprehensive methodology was employed, which included strategic planning, stakeholder engagement, and targeted events. Initial meetings were held with the work package leaders to outline the action plan and determine the best approach for obtaining robust results.

After the strategic planning phase, the target audiences were identified. It was essential to engage with **policymakers, stakeholders, and experts from the countries involved in the project, as well as neighbouring countries**, to ensure a comprehensive understanding of the subject matter.

A standalone workshop was organised to gather insights and feedback from policymakers and stakeholders. The online workshop was organised on 28/11/2024 and 29 stakeholders participated.

In addition to the independent workshop, **an event was held in conjunction with the ManuREsource 2024 conference**, where 2 round tables were organised (21/03/2024). This provided an opportunity to solicit feedback from a wider audience comprising organizations and specialized stakeholders actively engaged in the field. By integrating with an established conference, the project benefited from increased visibility, networking opportunities, and access to a broader range of expertise.

As a conclusion for workshop and round tables, the recognition of sustainability's importance in agriculture has grown significantly among farmers, policymakers, and stakeholders, highlighting the potential of bio-based fertilizers (BBFs) to address environmental concerns and promote sustainable farming practices. However, the high cost of BBF products remains a major obstacle to their widespread adoption. To overcome this, innovative financing models, subsidies, and cost-effective strategies are essential.

Additionally, regional variations in the accessibility and infrastructure for BBFs across Europe necessitate tailored strategies and investments to ensure equitable access and address infrastructure challenges. Localized approaches and policy tools, such as mandating minimum usage thresholds, introducing tax incentives, and implementing market obligations, are crucial for promoting BBF uptake while considering regional agricultural practices, preferences, and infrastructure.

While subsidies can drive BBF adoption, it is important to balance them with measures that prevent market distortions and ensure long-term sustainability. Policies that improve efficiency, reduce costs, and foster innovation are necessary to maintain market competitiveness and sustainability.

Ensuring the safety, quality, and transparency of BBF products is critical for building trust among farmers and end-users. Robust certification schemes, transparent labelling, and comprehensive quality assurance mechanisms are vital for enhancing product reliability and consumer confidence in BBFs.

Addressing the challenges and opportunities related to BBF uptake requires collaborative efforts and inclusive decision-making processes involving farmers, policymakers, industry stakeholders, and environmental organizations. Stakeholder engagement, knowledge exchange, and participatory approaches are essential for developing effective strategies and policies that support the widespread adoption of BBFs and promote sustainable agriculture.

To analyse the replicability analysis of the FERTIMANURE project in the CELAC region, INTA Argentina and LEITAT Chile used the methodology proposed by IPS Konzalting. The proposed methodology was based on carrying out different interactions with the stakeholders interested in the project in two different modalities:

- **Interactions in open seminars (webinars)** summarising the main results and lessons learned from the previous working packages (WP1, WP3, WP4 and WP5).
- **Face-to-face interactions** with different stakeholders considered essential for the project.
- **Web study** – web research in the CELAC region regarding BBFs and TMF, market research (level of BBF and TMF market in CELAC).

Two open seminars were held in online mode to reach both Chilean and Argentinian stakeholders. At the end of each event, a survey was sent out via Google questionnaire for each seminar participant to answer.

The first seminar was held on July 6, 2023, under the name “FERTIMANURE Sustainable biofertilizers and their adoption in the CELAC Region”. The second seminar took place on September 5, 2023, under the title: "New results of the FERTIMANURE project and its transfer to CELAC". An average of 60 stakeholders participated per webinar. Furthermore, face-to-face interviews were developed, where 28 stakeholders participated. The CELAC region presents great opportunities for the development of technologies for the production and use of BBFs and TMFs.

However, for its implementation to be successful, it will be necessary to focus on different points:

Create more knowledge about the technologies used in FERTIMANURE's biorefineries. In this sense, it is advisable to develop a dissemination strategy through training for the different stakeholders of the project (livestock and agricultural producers, technology providers, biogas plant operators, fertiliser producers, researchers, and policymakers). In addition, it would be advisable to install some pilot biorefineries and field trials with BBFs and TMFs as part of the dissemination plan. In this way, interested parties can review the benefits of installing these technologies in their region and consider various points to be considered before installation (required personnel, investment, difficulties in implementing the technology, impact on soil and crops using BBFs and TMFs, among others).

Encourage governments to create economic incentives from institutions for those who install these types of technologies on their farms.

Encourage dialogue with policymakers to develop legislation that supports and promotes the use of BBFs and to shorten approval times for new products so that they can be placed on the market immediately.

Work on developing national technologies to reduce technology costs and the problems arising from delays in importing products. This point is important as most respondents emphasized that they will only use BBFs if the

cost is the same or lower than conventional fertilisers. Therefore, the cost of production mustn't be extremely high.

Encourage the establishment of livestock cooperatives to set up centralized biorefineries for the treatment of livestock manure and the production of BBFs and TMFs.

More information can be found in the **D6.6. Policy proposals and guidelines for successful market uptake** and **D6.7 Report on FERTIMANURE replication potential in CELAC region**.

4.5. Market analysis

One technical task carried out in FERTIMANURE (M10-24) was a comprehensive market analysis of supply and demand for BBFs in the 8 EU countries.

Market landscape analysis was conducted within WP1 and WP6 to identify issues important for the sector's future development. The first step was assessing the market potential of FERTIMANURE end-products (BBFs and TMFs) within the EU fertiliser market. This included evaluating end-user preferences to understand key decision-making parameters for stakeholders. Emphasis was also placed on the CELAC fertiliser market and farmer acceptance of new fertilisers.

Key regional conclusions are as follows:

- The EU is a leading producer and exporter of agricultural products, with diverse production and farming structures that meet various market and consumer demands.
- Latin America is a significant net exporter of food and agricultural commodities. Argentina, a major food producer with large-scale agricultural and livestock industries, has benefitted from the past decade's commodity price boom. However, the region is highly vulnerable to climate change and socio-economic impacts, necessitating appropriate policies and measures to mitigate risks.
- The current fertiliser market in the EU and CELAC countries was analysed, focusing on the types of fertilising products to be developed in the FERTIMANURE project. This analysis aimed to provide insights into the market size, distribution, and connections between specific fertiliser types and agricultural sectors.

To address end-user preferences, a questionnaire was created, translated into 9 consortium languages, and distributed through various channels. The goal was to understand the market potential of FERTIMANURE end-products and identify important issues for sector development. In total, 612 responses were collected which are presented in D1.2 Report on market landscape analysis and end-user preferences in participating EU states.

Relevant data for market analysis was also collected via **a specially designed questionnaire** (*stream availability, target market and competition, technology applicability, pricing and forecast, previous research*). Within each country, the lead partners carried out a rigorous questionnaire procedure to gather information from the detected stakeholder groups. The emphasis was on discovering crucial socio-economic elements and detecting technical and legal guidelines to close the nutrient loops within the local market (sustainability of agronomic production by tapping existing agro side streams). Furthermore, an investigation of possibilities to valorise manure streams between different regions was performed (suitable action radius, financial and environmental aspects). Through a specialized questionnaire, stakeholders were presented with 3 cases of different types of fertilisers. Based on differences in prices, the form of fertiliser, nitrogen and organic matter content and other parameters, participants selected the preferred fertiliser and determined what was crucial for making the decision. The questionnaire has been prepared in the Survey Sparrow app and total 9 language versions were created. The responses collection was an obligatory segment of the organized 2 brainstorm sessions per country (T6.2).

It was proven through the questionnaire that although BBFs have a bright future, they need to offer affordability to be competitive in the market. It is also important to secure quality regarding the content of organic matter and reduced risk of infection, followed by nutrients action rate.

With the aim of risk assessment and better understanding and placement of BBFs on the market, a SWOT

analysis was carried out as part of the project. SWOT analysis is a qualitative analytical method by which the strengths and weaknesses, advantages and problems of the considered object or phenomenon are assessed by grading the elements within the 4 fields of analysis. The SWOT analysis and stakeholder opinion represent an important segment for further distribution and placement of BBFs on the market.

During the project, Polish partners (PCZ) were subcontracted and contributed to the creation of a report on the market. Their research covered market segmentation and targeting, capturing competitors—primary and secondary, the Polish subsidy systems, and the pricing of BBFs. The results are presented in the report D6.5 Business Plans and Business Models.

Regarding the market analysis and based on the collected input within the project, position paper on How to boost BBFs in the European market (*A Joint Position Paper of the 5 RUR08 Sister projects)* was prepared. Prepared position paper emphasizes the need for a clearer and more stable definition of BBF prices, advocating for financial mechanisms and stakeholder engagement. Initiatives like the 5 projects funded in the CE-RUR-08-2018-2019-2020 topic underscore the importance of collaborative efforts in successfully adopting newly produced fertilisers from secondary sources.

All collected input helped with the preparation of methodology for business plans and models which are presented in report D6.5 Business Plans and Business Models.

As a summary, regarding the market analysis, two segments were covered:

Stakeholders attitude

- **Stakeholders mapping**

agricultural producers, fertilisers processing industry, academia and research, business and financial advisors, policy makers and authorities, public entities and general public.

- **End-users preferences questionnaire**

to understand market potential of the end-products through the preferences of end-users.

- **SWOT analysis**

analysis of the non–technical barriers and opportunities for the implementation of end-products in different regions.

- **Brainstorm sessions**

2 brainstorm session in each of the participating countries.

- **Choice experiment**

to discover crucial socio-economic elements and detect technical and legal guidelines to close the nutrient loops within the local market.

- **Exploitation of the results in EU and CELAC region**

Go-to-market strategy

- **Consultations with technical experts**

Pilots opinion on BBFs produced within the project (country profile (attractiveness of fertilisers, ease of putting it on the market), fertiliser characteristics (OM, quality, infection risks), etc.).

- **Brainstorm sessions with the fertilising industry**

Communication with Fertilizer Europe, Yara – recieved input on draft version of FERTIMANURE's Business Model Canvas for fertiliser industry;
Meeting regarding the prices.

- **Agro expert's recommendations**

Recieved input on the agronomic performance of BBFs.

- **One pagers for researchers/farmers**

One pagers include - type and nutrient content, advantages and disadvantages, pricing, etc.

- **Subcontracting of Polish partners (PCZ)**
- **Web research regarding the market analysis (BBFs and TMFs)**

4.6. Commercialization strategy

The revision of the Fertilisers Regulation (2016/0084 [COD]) aims to support market growth and transition towards a competitive, resilient, and sustainable EU fertiliser industry. FERTINAGRO, a leading supplier in Spain, provides farmers with sustainable and efficient nutrition solutions, emphasizing close collaboration with them. They have developed Integral Fertilization Programs (IFP) tailored to specific crops and regions, optimizing nutrition plans based on soil and crop characteristics.
FERTINAGRO's business plan for this project involves developing IFPs for targeted crops in selected locations, using both pilot products and their existing portfolio. They offer technical advice and complementary fertilisers/biostimulants to create balanced IFPs, thus gaining economic benefits by avoiding the cost of raw material purchases and resales. They are prepared to launch new biofertilisers developed in the project, leveraging their production and commercialization capacity.

A crucial aspect for market entry of BBFs/TMFs is ensuring price competitiveness with conventional fertilisers. Reducing treatment costs for slurries and manures, currently between 6 to 18 €/m3, and generating revenue from BBF sales can enhance economic sustainability. Environmental benefits, such as reduced costs for water remediation, should also be considered. Recognizing that the market may not be fully prepared for the pricing dynamics of BBFs, it is crucial to address this challenge through financial mechanisms, potentially in the form of subsidies. These subsidies play a crucial role in facilitating the market's transition to sustainable practices, making BBFs more economically viable and accessible.

Transparent communication with stakeholders about pricing and product availability is vital for BBF market adoption. Stakeholders believe that BBFs can lower mineral fertilisation costs, improve soil quality, and compete with mineral fertilisers, prompting price reductions. Linking BBF prices to carbon content and aligning with the European Commission's climate initiatives could further promote sustainable agricultural practices and a resilient agri-food value chain.

4.6.1. Business model for farmers

The commercialization strategy was developed fully in the FERTIMANURE Business Plans and Models, D6.3 and D6.5, however their preliminary descriptions are given below.

Farmers dealing with manure management currently face the problem of implementing cost-effective technologies for manure management. By implementing one of the valorisation approaches proposed in FERTIMNAURE, the farmer would include a new business line on its farm by producing high-quality fertilisers products that can be used directly on-farm (mixed systems) or sold at fertiliser companies to produce TMF. The following figure shows the initial CANVAS model proposed for farmers to exploit the results derived from FERTIMANURE.

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITIONS	CUSTOMER RELATIONSHIP	CUSTOMER SEGMENTS
technology providers (SMEs, environmental angeineering companies etc.) **distributors** **public authorities** **end-users** **citizenship** **consultants** (legal constraints, funding mechanisms etc. **research institutions**	**standardization** and continuous **quality control** of BBF development of **communication channels with end-users** to ensure BBF acceptance **field trial cases** to showcase BBFs comparative advantages **BBFs branding** and distinction when compared to regular fertilizers **KEY RESOURCES** engagement of **diverse end-users** **financial capacity** **technological and logistical setup** for BBFs production / application (e.g. equipment) subject´s basic know-how and **educational path to new research** findings (technology, products)	**innovation factor high**-added value of biobased products **standardized & safe BBF with high NUE** and agronomic performance **market attractiveness -** satisfying existing market needs and creating new needs **constribution to food security, decrease in environmental impacts** **manure/slurry valorisation setup** that go beyond current recovery process solving inter and intra regional **nutrient imbalances** **locally / regionally present BBFs** (closes nutrient cycle, transport costs reduced if marketed locally) **reduced dependence** of fertilizers supply due to **geopolitical issues** across the world	**long-term and stable relationship with customers** **"showcase field trials"** accompanies by stakeholders open-discussion on BBFs improvements **development of support mechanisms** that transfer research/lab results into user friendly guidelines **CHANNELS** **end-users engagement plan** **fertilizer companies** in the Consortium **direct targeting** to current customers of the partners and new prospects application of **online and offline marketing strategies** for innovative products and development of **business network** (different stakeholder groups)	**fertilizer companies** use of intermediate products to produce high-quality end BBF: chemical fertilizers - organic amendments - biostimulants **farmers** direct use of produced intermediate products **regional community** e.g. cities and regions that support green technologies and need fertilizers for horticultural purposes **research institutions**

COST STRUCTURE	REVENUE STREAMS
CAPEX - for the implementation of the recovery technologies at farm, including costs related to administrative and permitting procedures **OPEX -** including human capital costs, reagents, logistics etc. for the operation **EU and national funding mechanisms -** to support either investment or operation of new and/or innovative technologies implementation	**sales of chemicals** to chemical / fertilizer companies and/or directly to farmers (e.g. ammonium sulphate/nitrate/phosphate etc.) **sales of organic amendments and biostimulants** to organic fertilizer companies/directly to farmers **avoided costs** of external manure management **rent of recovery technology** to other stakeholders (e.g. small-scale farmers etc.)

Figure 1. Preliminary Business Model Canvas for farmers

The Business Model Canvases were further upgraded during the project and according to research findings and stakeholder's notions. The figures below show **the final versions of the Business Model Canvases related to farmers for each region included in the FERTIMANURE project.**

- **ITALY**

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	CUSTOMER RELATIONSHIP	CUSTOMER SEGMENTS
technology providers (SMEs, environmental angeineering companies etc.) distributors public authorities end-users citizenship consultants (legal constraints, funding mechanisms etc. research institutions	standardization and continuous quality control of BBF development of communication channels with end-users to ensure BBF acceptance field trial cases to showcase BBFs comparative advantages BBFs branding and distinction when **KEY RESOURCES** production plant technical support to control the process and the outcome financially self-suport stable and reliable input material	stable and reliable source of fertiliser independent from external conditions (war, inflation, speculation, etc.) increase of organic matter in the soil, longer positive effect on the field reduction of leaching nutrients which secures lower environmental impact and higher efficiency new source of income for the company/farm that produces and transform manure into BBFs	importance of reliability in the content of nutrients stability and homologation of the product along the seasons provided support during the optimization of the plant and during the definition of the right application strategies in the field **CHANNELS** local distributors directly from the production plant	fertiliser companies use of intermediate products to produce high-quality end BBF: chemical fertilisers - organic amendments - biostimulants farmers direct use of produced intermediate products regional community e.g. cities and regions that support green technologies and need fertilisers for horticultural purposes research institutions

COST STRUCTURE	REVENUE STREAMS
CAPEX - for the implementation of the recovery technologies at farm, including costs related to administrative and permitting procedures OPEX - including human capital costs, reagents, logistics etc. for the operation EU and national funding mechanisms - to support either investment or operation of new and/or innovative technologies implementation	sales of chemicals to chemical / fertiliser companies and/or directly to farmers (e.g. ammonium sulphate/nitrate/phosphate etc.) sales of organic amendments and biostimulants to organic fertiliser companies/directly to farmers avoided costs of external manure management rent of recovery technology to other stakeholders (e.g. small-scale farmers etc.)

Figure 2. The final version of Business Model Canvas – Italy

- **CROATIA**

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	CUSTOMER RELATIONSHIP	CUSTOMER SEGMENTS
technology providers (SMEs, environmental angeineering companies etc.) distributors public authorities end-users citizenship consultants (legal constraints, funding mechanisms etc. research institutions	standardization and continuous quality control of BBF development of communication channels with end-users to ensure BBF acceptance field trial cases to showcase BBFs comparative advantages BBFs branding and distinction when compared to regular fertilisers	possibility of cost optimization contribution to a slower release of components in the soil, thus ensuring slower leaching reduction of harmful impacts on the environment contribution to food safety	the relationship between customer/customer - importance of providing safety importance of good communication the organisation of workshops - transfer of knowledge	fertiliser companies use of intermediate products to produce high-quality end BBF: chemical fertilisers - organic amendments - biostimulants farmers direct use of produced intermediate products regional community e.g. cities and regions that support green technologies and need fertilisers for horticultural purposes research institutions
	KEY RESOURCES link between the real sector and researchers and ensure upscale research acceptable prices of mechanization general price acceptability of BBFs		**CHANNELS** agricultural pharmacies associations, group or individual consultations internet sales transfer of knowledge between sectors	

COST STRUCTURE	REVENUE STREAMS
CAPEX - for the implementation of the recovery technologies at farm, including costs related to administrative and permitting procedures OPEX - including human capital costs, reagents, logistics etc. for the operation EU and national funding mechanisms - to support either investment or operation of new and/or innovative technologies implementation	sales of chemicals to chemical / fertiliser companies and/or directly to farmers (e.g. ammonium sulphate/nitrate/phosphate etc.) sales of organic amendments and biostimulants to organic fertiliser companies/directly to farmers avoided costs of external manure management rent of recovery technology to other stakeholders (e.g. small-scale farmers etc.)

Figure 3. The final version of Business Model Canvas - Croatia

- **GERMANY**

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	CUSTOMER RELATIONSHIP	CUSTOMER SEGMENTS
technology providers (SMEs, environmental angeineering companies etc.) distributors public authorities end-users citizenship consultants (legal constraints, funding mechanisms etc. research institutions	standardization and continuous quality control of BBF development of communication channels with end-users to ensure BBF acceptance field trial cases to showcase BBFs comparative advantages BBFs branding and distinction when compared to regular fertilisers	positive input to soil health targeted fertilisation possible sustainable farming	customer-customer relationship" - most important is communication customer-scientist relationship" - simple and understandable explanations and facts customer - government relationship" - clarity in the legal basis and requirements for the farmers	fertiliser companies use of intermediate products to produce high-quality end BBF: chemical fertilisers - organic amendments - biostimulants farmers direct use of produced intermediate products regional community e.g. cities and regions that support green technologies and need fertilisers for horticultural purposes research institutions
	KEY RESOURCES defined nutrient content of the manufactured BBFs secured supply chains importance of knowledge transfer for market acceptance - origin and production process of the BBFs must be transparent and traceable		**CHANNELS** specialist consultants classic sales staff from certain well-known department stores (BayWa, Raiffeisen…)	

COST STRUCTURE	REVENUE STREAMS
CAPEX - for the implementation of the recovery technologies at farm, including costs related to administrative and permitting procedures OPEX - including human capital costs, reagents, logistics etc. for the operation EU and national funding mechanisms - to support either investment or operation of new and/or innovative technologies implementation	sales of chemicals to chemical / fertiliser companies and/or directly to farmers (e.g. ammonium sulphate/nitrate/phosphate etc.) sales of organic amendments and biostimulants to organic fertiliser companies/directly to farmers avoided costs of external manure management rent of recovery technology to other stakeholders (e.g. small-scale farmers etc.)

Figure 4. The final version of Business Model Canvas – Germany

- **SPAIN**

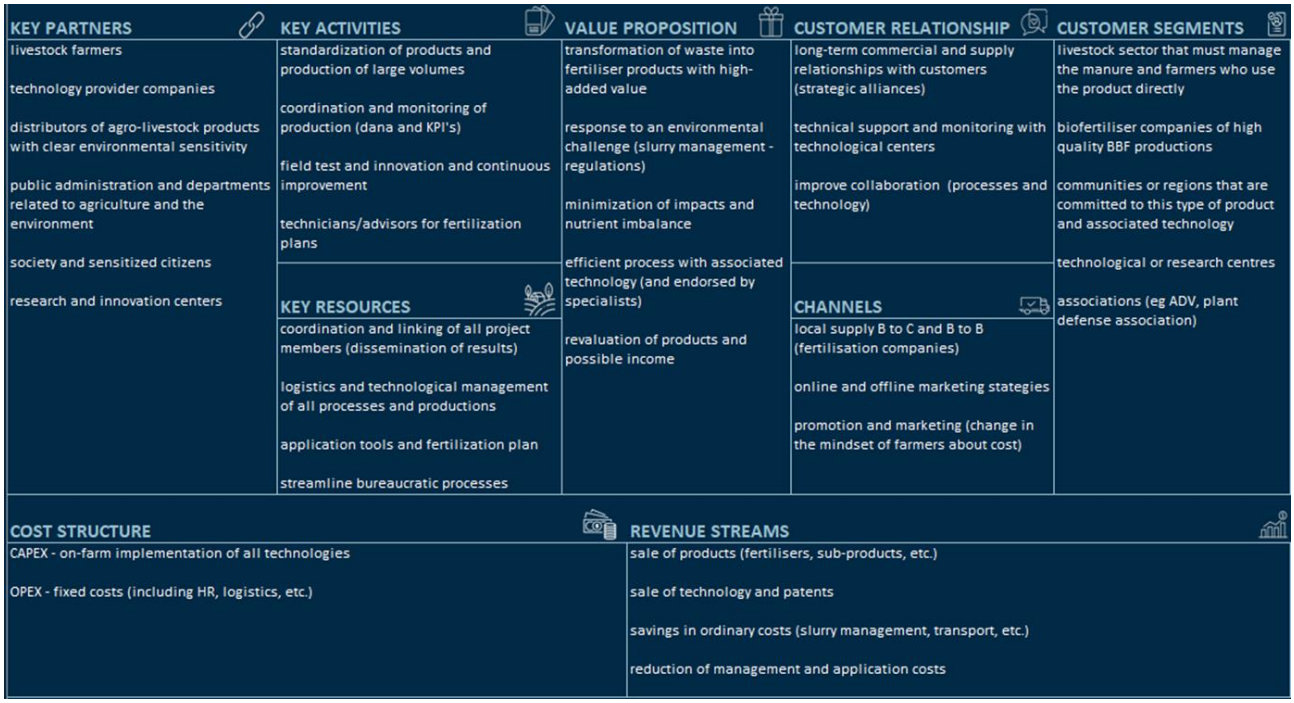

Figure 5. The final version of Business Model Canvas – Spain

- **BELGIUM**

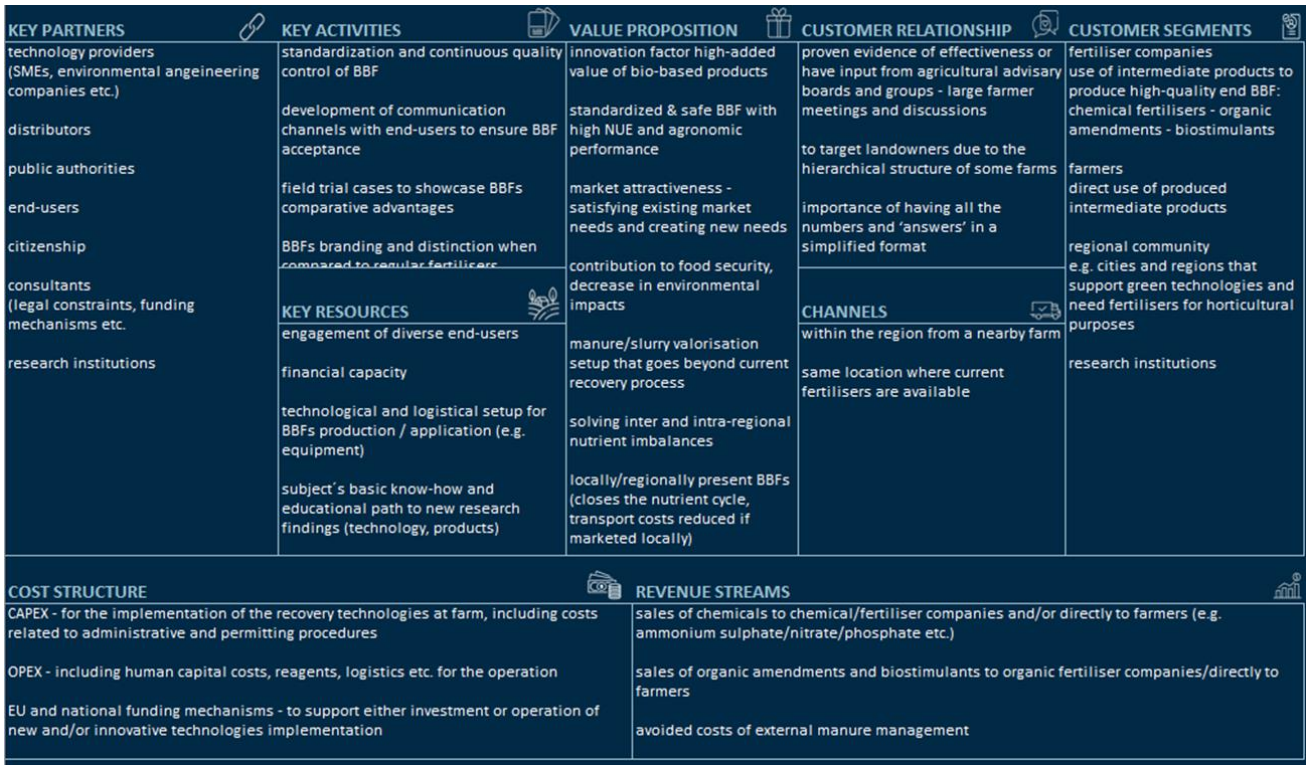

Figure 6. The final version of Business Model Canvas – Belgium

- **THE NETHERLANDS**

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	CUSTOMER RELATIONSHIP	CUSTOMER SEGMENTS
technology providers (SMEs, environmental angeineering companies etc.) distributors public authorities end-users citizenship consultants (legal constraints, funding mechanisms etc. research institutions	standardization and continuous quality control of BBF development of communication channels with end-users to ensure BBF acceptance field trial cases to showcase BBFs comparative advantages BBFs branding and distinction when compared to regular fertilisers **KEY RESOURCES** knowledge and innovation research capacity and budget human capacity	splitting manure into a different fraction with specific nutrient characteristics - more precise fertilisation in quantity and quality, which can potentially increase fertiliser nutrient use efficiencies reducing emissions and environmental impact replacement for synthetic fertiliser use and costs better valorisation of own manure that can be used on own farm	mutual interest, trust and responsibility between the production and consumption side work with contracts in which the intentions and responsibilities of different producers and consumers are mutually agreed „customer – researcher" relationship - clear realistic and innovative research tasks and questions and **CHANNELS** liquid streams/products - distribution in the nearby region more concentrated products - distribution at larger distances Fertiliser companies/traders and agronomic advisory organisations	fertiliser companies use of intermediate products to produce high-quality end BBF: chemical fertilisers - organic amendments - biostimulants farmers direct use of produced intermediate products regional community e.g. cities and regions that support green technologies and need fertilisers for horticultural purposes research institutions

COST STRUCTURE	REVENUE STREAMS
CAPEX - for the implementation of the recovery technologies at farm, including costs related to administrative and permitting procedures OPEX - including human capital costs, reagents, logistics etc. for the operation EU and national funding mechanisms - to support either investment or operation of new and/or innovative technologies implementation	sales of chemicals to chemical / fertiliser companies and/or directly to farmers (e.g. ammonium sulphate/nitrate/phosphate etc.) sales of organic amendments and biostimulants to organic fertiliser companies/directly to farmers avoided costs of external manure management

Figure 7. The final version of Business Model Canvas – The Netherlands

- **FRANCE**

KEY PARTNERS	KEY ACTIVITIES	VALUE PROPOSITION	CUSTOMER RELATIONSHIP	CUSTOMER SEGMENTS
technology providers (SMEs, environmental angeineering companies etc.) distributors public authorities end-users citizenship consultants (legal constraints, funding mechanisms etc. research institutions	standardization and continuous quality control of BBF development of communication channels with end-users to ensure BBF acceptance field trial cases to showcase BBFs comparative advantages BBFs branding and distinction when compared to regular fertilisers **KEY RESOURCES** the significant need for skilled human resources investment in large production units to avoid niche markets standardized process in order to have quality products research about BBFs efficiency and field trials (on real conditions)	a large role in the fertiliser market if the price is affordable due to current geopolitical conditions possibility of solving problems related to the nitrogen volatilization potential in avoiding the monopoly of producing fertilisers the ability to relocate mineral elements from breeding in regions without breeding BBFs can be more balanced fertilisers on NPK and micronutrients than synthetic fertilisers	quality and effectiveness of the product, followed by a great dissemination effort; communication and transparency advised about the sanitary and quality of the BBFs trial results and comparison with current fertilisers (cost/efficiency/categorisation of manure) **CHANNELS** market uptake - local distribution on farm production local sales representative/agent	fertiliser companies use of intermediate products to produce high-quality end BBF: chemical fertilisers - organic amendments - biostimulants farmers direct use of produced intermediate products regional community e.g. cities and regions that support green technologies and need fertilisers for horticultural purposes research institutions

COST STRUCTURE	REVENUE STREAMS
CAPEX - for the implementation of the recovery technologies at farm, including costs related to administrative and permitting procedures OPEX - including human capital costs, reagents, logistics etc. for the operation EU and national funding mechanisms - to support either investment or operation of new and/or innovative technologies implementation	sales of chemicals to chemical / fertiliser companies and/or directly to farmers (e.g. ammonium sulphate/nitrate/phosphate etc.) sales of organic amendments and biostimulants to organic fertiliser companies/directly to farmers avoided costs of external manure management

Figure 8. The final version of Business Model Canvas – France

4.6.2. Business model for fertiliser companies

Two value propositions are defined for fertiliser companies. On one side, fertiliser companies need to diversify their source of nutrients to produce their TMF, therefore they will produce biobased TMF from secondary renewal resources. On the other side, in mixed farming systems, a new model was proposed in which TMF are directly produced on-farm and the fertiliser companies sell to farmers the supplements/additives to produce these TMF (FERTINAGRO patented process). Depending on the value proposition, farmers act as suppliers or customers of fertiliser companies. The following figure shows the preliminary CANVAS model proposed for fertiliser companies to exploit the results derived from FERTIMANURE.

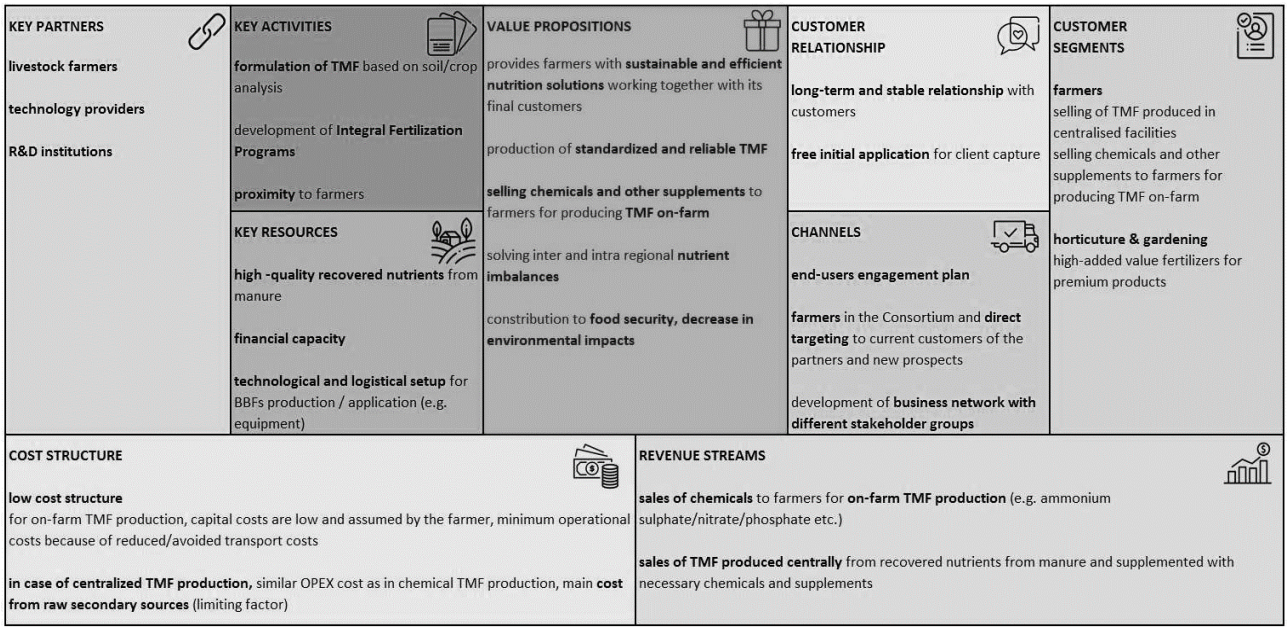

Figure 9. CANVAS business model for fertiliser companies

The BMC was further upgraded during the project's lifetime and according to research findings and stakeholders.

The project partners (Fertinagro, Fertilizer Europe) were involved in updating the BMC for fertiliser industry. Except project partners, help in finalisation of an update of BMC for fertiliser industry was received from YARA.

Based on the contacts they have and those they consider relevant, all of them contributed to the development of the business model.

The final version of a Business Model Canvas for fertiliser industry is shown below.

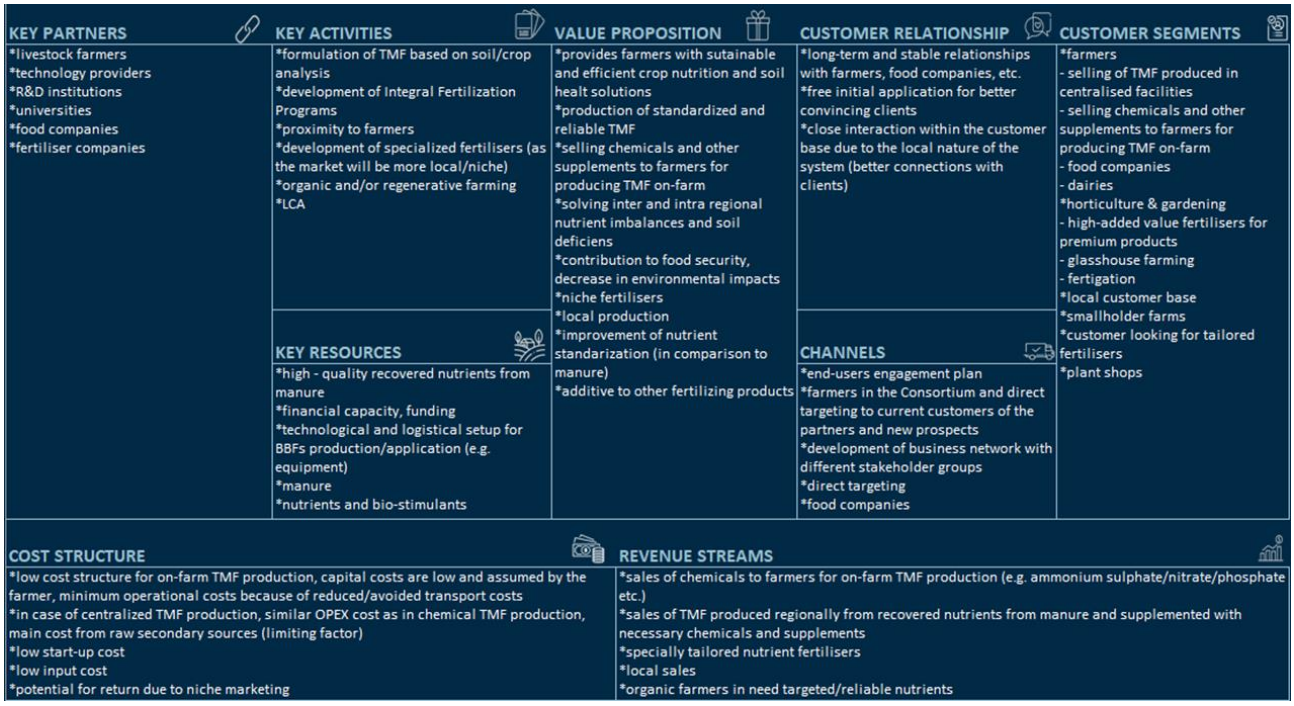

Figure 10. The final version – Business Model Canvas for the fertiliser industry

4.7. Exploitation strategy per partner

In addition to a common exploitation plan developed within the project, partners also exploited individually their results during and after the end of the project as presented in the following table:

Table 8. Exploitable results of FERTIMANURE

Partner	Exploitable Result	Routes to exploitation	Targeted stakeholders	Time frame
UVIC	Freeze Concentration Technology	Upscaling to TRL 7-8	Livestock producers, waste management companies	2 years post project
UVIC	Biodrying + Thermal Treatment	Upscaling to TRL 7-8	Livestock producers, waste management companies	1 year post project
UVIC	ILCD Datasets	Implementation in LCA databases	LCA software developers	End of the project
UVIC	Decision Support System for farmer advice	DSS available on-line. Consultancy service	Livestock producers, farmers, fertilizer companies	End of the project
FHR	TCR process with zeolite	Upscaling to TRL 7-8 and further testing for homologation & commercialization	Livestock producers, waste management companies, biofuel companies	2 years post project
FHR	Selective NH_3 removal from syngas	Upscaling to TRL 7-8 and further testing for homologation & commercialization	Livestock producers, waste treatment sector, coke and steel sector	2 years post project
FHR	Phosphorus recovery from biochar and ammonium phosphate production	Upscaling to TRL 7-8	Livestock producers, wastewater companies, fertilizer companies	2 years a post project
LEITAT	Membrane contactors	Upscaling to TRL 7-8	Livestock producers, agro-industrial companies, waste and wastewater utilities.	2 years post project

LEITAT	Micro-algae reactor	Upscaling to TRL 7-8	Fertilizer companies	2 years post project
ALGE	Scenedesmus based biostimulant	Broadening existing microalgae based biostimulant portfolio.	Fertilizer companies, Agroindustry	1 year post project
UGENT	Nitrogen recovery (stripping) process	Upscaling to TRL 7-8	Livestock producers, waste management companies	2 years post project
FERT	On-farm TMF production through the patent WO2017ES070793	Upscaling to TRL 7-8 and further testing for homologation & commercialization	Livestock producers	1 year post project
FERT	New Integral Fertilization Programs	Further testing for commercialization	Farmers, Agroindustry	1 year post project
AGRI	Microbial activated organic amendments	Further testing for commercialization	Farmers, Agroindustry	2 years post project
RITTMO	Pyrolysis mobile treatment plant	Further testing for commercialization	Livestock producers	1 year post project
RITTMO	Stripping mobile treatment plant	Further testing for commercialization	Firms proposing services to farms	3 years post project
RITTMO	Relevant information for BBF/TMF standardisation	Submitting project results to relevant standardisation committees	Policy makers	1 year post project
APF	Operational management experience with Nutrient Recovery System	Upscaling to TRL 7-8	Livestock producers, biofuel companies, waste management companies	2 years post project
APF	Practical information of the product quality and value and recovered products for the market	Further development of the NRR system into practice to TRL 7-8	Livestock producers, biofuel companies, waste management companies	2 years post project
DORSET	Nitrogen recovery (stripping) process	Further testing for licensing and commercialization	Livestock producers waste management companies	2 years post project
WENR	Phosphorus recovery (stripping) process	Upscaling to TRL 7-8	Livestock producers, waste management companies	2 years post project
APCA, DARP	Integral Fertilization Programs (PFIs) for each target crop	Further testing for commercialization	Farmers, Agroindustry	2 years post project

APCA, DARP	Integral Fertilization Programs (PFIs) for each target crop	Training sessions	Farmers and advisors	1 year post project
IPS	Development on the market analysis of supply and demand of BBF	Further analysis and market research, broadening database	Livestock producers, farmers, waste treatment sector	1 year post project
GWIN, ELO	Practice Abstracts	Presenting FERTIMANURE in an understandable way	Livestock producers, farmers, policy makers	End of project
INTA, LEITAT	FERTIMANURE replication potential in CELAC	Consultancy services to farmers in Argentina, Chile and others	Livestock producers, farmers, policy makers	End of project
WENR	FERTIMANURE TMF-Nutrition Tool	Tool available on-line. Consultancy service	Livestock producers, farmers, fertilizer companies	End of project
RITTMO	FERTIMANURE Regulatory Tool	Tool available on-line. Consultancy service	Livestock producers, farmers, fertilizer companies, policy makers	End of project
UGENT	FERTIMANURE Logistics Model	Consultancy service	Livestock producers, farmers, fertilizer companies, researchers	End of project
IPS	FERTIMANURE Business Tool	Tool available on-line. Consultancy service	Livestock producers, farmers, fertilizer companies	End of project

Research Centres and Universities benefit from FERTIMANURE results mainly from:

- 15 Scientific publications published;
- Advancement of knowledge on the technological aspects linked to the FERTIMANURE technological innovations;
- Technology transfer of novel solutions for nutrient recovery, from lab-based prototypes and tests to pilot plants tested at real environment (TRL 6-7);
- Direct contact and exposure to relevant industrial partners;
- Creation of the ESNI Community.

4.8. Methods for assuring impact and exploitation

FERTIMANURE partners are involved in broad and relevant networks that were used as levers to map and ensure successful outreach to relevant stakeholders. GreenWin, as an industrial cluster active in green chemistry and industrial biotechnologies, as well as the Biorefine Cluster Europe, initiated and coordinated by UGENT, have excellent connections with national and international clusters in their fields (sustainable chemistry, agro-industry and bio-based resource recovery respectively). GreenWin is also a member of EU networks and associations, such as the BIC consortium and the Vanguard initiative Bioeconomy pilot. In addition, FERTINAGRO and UVIC are members of the BIC consortium. RITTMO is involved in “4 per 1000” initiative and tried to link with BBF developed and possibilities to store MO from BBF in soils. Several partners are involved in related EU projects and initiatives and based on that, built bridges between them and FERTIMANURE and hence foster synergies between their respective communities.

Since the beginning of the project, FERTIMANURE became member of the European Sustainable Phosphorous Platform (ESPP), ESPP is particularly engaged in phosphorus recycling, addressing technologies, industrial implementation and regulation, safety and social acceptance of contaminants in recycled nutrient sources and agricultural value of recycled nutrient products. FERTIMANURE has been active in several activities organized by ESPP and have also been involved in collaborating with different position papers promoted by ESPP. Moreover, FERTIMANURE also took a relevant role in the topic of “Need to reach a consensus in Bio-based fertilisers definition”.

Another relevant action is the initiative that FERTIMANURE has worked together with the Biorefine Cluster Europe (coordinated by UGENT), of creating the “European Sustainable Nutrient Initiative” (ESNI). ESNI aims to foster collaboration among European entities engaged in nutrient recycling, facilitating the exchange of valuable experiences and identifying knowledge gaps to guide future research. The ESNI Community is a platform that offers EU projects, companies, research institutes and experts the opportunity to share knowledge, achieve common objectives and raise their voice towards EU policy makers. In this community, FERTIMANURE has been leading the “Technologies for nutrient recovery” working group and also has been active in the three other working groups created in the framework of ESNI.

Additionally, FERTIMANURE has been quite active in the different partners regions by organising different brainstorm sessions with local stakeholders as well as demo days to show pilots and agronomic testing. These sessions have permitted to reach 800 stakeholders to ensure the impact and exploitation of the project outcomes.

Finally, the active participation in events, but also the organisation of 5 large-scale events have been a powerful tool to promote the project outcomes and have helped noticeably in the exploitation of the results obtained through the different stakeholders groups.

4.9. IPR Management

Intellectual property (IP) generated within the project is protected by patents, if appropriate, and its management is regulated in compliance with the consortium agreement and the IP agreement among the partners. The consortium has identified three levels of IP, which were created during the project: i) **Individual and joint IP**, which belongs to individual partners or is jointly owned by partners working on a particular task and is restricted to those partners and likely to be covered by patents/licensing. ii) **Generic IP**, which can be used by all partners of the consortium. Some generic IP was made more widely available to European

academics, SME's and other industrial organizations. iii) **Publicly available IP**, published at conferences, on the public website and made available with no restrictions. The general principles for Intellectual Property Aspects set out by the EC for Horizon2020 projects were applied in the FERTIMANURE. **Existing know-how (background or pre-existing intellectual property)** of a specific partner was available within the consortium, but strictly limited for use to the achievement of the project goals and the duration of the project. Each partner owns the foreground he/she develops and is responsible for securing the IP of the knowledge or results created during the project. **Results:** owned by one or more of the partners were licensed to other partners of the consortium on favourable conditions to the extent necessary to enable these partners to exploit their own results. **Publication of results:** While project results should be published in the usual scientific form, all concept publications must be submitted to all partners together with a request for permission to publish.

4.9.1. IPR Background (CONFIDENTIAL)

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4.9.2. Exploitable results (CONFIDENTIAL)

4.9.3. Characterisation of potentially exploitable results from FERTIMANURE project (CONFIDENTIAL)

4.9.4. Market analyses (CONFIDENTIAL)

5. Discussion

All partners of the consortium contributed to the dissemination and exploitation according to their foreseen role and effort and using all available tools, thus for instance by participating and giving presentations at conferences, publishing papers, holding press conferences, networking and similar activities and striving to maximize the existing dissemination channels for the purpose of project result adoption and successful future commercialization of FERTIMANURE outputs.

The FERTIMANURE audience is manifold: (i) key agriculture and industry players, (ii) research and education community, (iii) policy makers and authorities, (iv) investors in bioeconomy, (v) industry of equipment supply, and (vi) rural communities and society.

Furthermore, FERTIMANURE promotes project presentations at scientific conferences targeting relevant domains for the project. The impact of presentations at this kind of event is very high because of the attendance of scientists and industrial experts. Next to this, Industrial and academic partners individually and in collaboration published and presented scientific advances in technical papers as well as in journals (peer-reviewed or not) and magazines.

All consortium partners were encouraged by the partner responsible for dissemination to report the results of each dissemination activity immediately after they were presented. The reports included feedback gathered by the respective partner from the target audience (if applicable). For monitoring purposes, the dissemination activities were reassessed regularly and conveyed to the Project Technical Committee by GreenWin during the project progress meetings that took place every month.

For the purposes of evaluation of FERTIMANURE dissemination activities, quantitative indicators and associated metrics were set up where applicable – including KPIs for website, social media, printed materials, videos and newsletters.

6. Conclusions

The outputs of the FERTIMANURE project would have a direct impact on the EU Circular Economy Strategy, which aims to boost the emergence and commercialisation of these new fertilisers. The FERTIMANURE project provide clear evidence-based information regarding the quality and performance of the different end-products obtained to ensure their market uptake.
In Annex I, the FERTIMANURE consortium has prepared a list of planned articles for scientific Journals, and in Annex II, a list of planned articles for magazines, sectorial publications, etc.

One technical task carried out in FERTIMANURE (M10-24) was a comprehensive market analysis of supply and demand for BBF in the 7 EU countries.

In addition to a common exploitation plan developed within the project, partners also exploit individually their results during and after the end of the project. The exploitation strategy reflect and was built-up as a result of a sound analysis of the market trends (WP6), potential users and financial sustainability.

Two value propositions are defined for fertiliser companies. On the one side, fertiliser companies are in need of diversifying their source of nutrients to produce their TMF, therefore they produced biobased TMF from secondary renewal resources. On the other side, in mixed farming systems a new model is proposed in which TMF are directly produced on-farm and the fertiliser companies sell to farmers the supplements/additives to produce these TMF (FERTINAGRO patented process).

Intellectual Property Rights (IPR) is a valuable strategic and financial asset for every project meaning it should be carefully managed. The IPR Management focuses on the careful handling of IPR issues in the FERTIMANURE project, that are of strategic importance to facilitate the (commercial) exploitation of its end-products and innovative technologies. It aims to create a favourable environment for respecting intellectual property rights (IPR) and ensuring a uniform approach by the FERTIMANURE participants, in conjunction with permanent IP monitoring during the project.

FERTIMANURE puts lots of effort through different WPs (WP1 – T1.2, WP4, WP6, WP7) to ensure continuous involvement of different stakeholder groups, aiming to actively involve farmers, fertilisers industry, technology providers, policy makers, citizens and other relevant stakeholders covering the whole value chain. The goal is to properly focus on all the activities and guarantee a positive impact on all results. Different communication channels and activities were used for the dissemination of project results in a user-friendly manner.
Better insight was provided through webinars, advertising through the media and social sites. Exploitation of foregrounds happened during and after FERTIMANURE execution to convey the right message to the right stakeholder. Each type of stakeholders was expected to engage variously with the project and to provide different feedback.

7. Recommendations

Communication and dissemination activities play an important role in increasing the impact of an H2020 project. Communication aims to create awareness of the EU initiatives and promote the project and its results to a very differentiated target of audience ranging from stakeholders and investors to the media and great public. Dissemination is more focused on fostering the transfer of knowledge created within the project to make the results available for others to use.

The FERTIMANURE audience: (i) key agriculture and industry players, (ii) research and education community, (iii) policy makers and authorities, (iv) investors in bioeconomy, (v) industry of equipment supply, and (vi) rural communities and society.

The Dissemination Plan for the FERTIMANURE project represents the strategic vision of the Consortium in terms of communication of the FERTIMANURE project itself and its achievements and outputs as well. The partners responsible for dissemination (GreenWin) led the communication and dissemination activities whereas partners such as Fertilizers Europe (industries), European Landowners Association and or French Chambers of Agriculture (Farmers and Policy makers) also had a key role in maximizing FERTIMANURE impact.

The Exploitation Plan is designed to multiply the impact of the proposed solutions and prepare the transition towards industrial and commercial uptake to fully achieve the expected impact. IPS, as the main expert in this regard in the consortium and leader of WP6 “Market potential, business plan, and exploitation, served as the main contact and manager for this aspect of the project.

Annexes

ANNEX I - Scientific publications

	Proposed by	Scientific journal name	Tentative article title	Author of the publication	Link	Publication date
1	UGENT	Ecological Engineering	Evaluation of a new approach for swine wastewater valorisation and treatment: A combined system of ammonium recovery and aerated constructed wetland	Claudio Brienza, Natalia Donodo, Hongzhen Luo, Ruben Vingerhoets, Denis de Wilde, Dion van Oirschot, Ivona Sigurnjak, Jayanta Kuma, Evi Michels, Erik Meers	https://www.sciencedirect.com/science/article/abs/pii/S092585742300289?dgcid=coauthor	April 2023
2	UGENT	Journal of Cleaner Production	Detailed nitrogen and phosphorus flow analysis, nutrient use efficiency and circularity in the agri- food system of a livestock-intensive Region	Ruben Vingerhoets, Marc Spiller, Joris De Backer, Anne Adriaens, Siegfried E. Vlaeminck, Erik Meers	https://www.sciencedirect.com/science/article/pii/S09596526231436 1?via%3Dihub	April 2023
3	UGENT	Biocatalysis and Agricultural Biotechnology	Ammonia water as a biobased fertiliser: evaluating agronomic and environmental performance for Lactuca sativa compared to synthetic fertilisers	Vaibhav Shrivastava, Ivona Sigurnjak, Nimisha Edayilam, Erik Meers	https://doi.org/10.1016/j.bcab.2023.102907	November 2023

4	UVIC	The International Journal of Life Cycle Assessment	Life cycle assessment of bio-based fertilizers production systems: where are we and where should we be heading?	D. Egas, S. Azarkamand, C. Casals, S. Ponsá, L. Llenas &J. Colón	https://link.springer.com/article/10.1007/s11367-023-02168-8	May 2023
5	LEITAT	Science of the Total Environment	Nutrient recovery and valorisation from pig slurry liquid fraction with membrane technologies	Rubén Rodríguez, Julia Zapata, Xialei You, Montserrat Pérez, Sonia Sanchis, Julia García	https://www.sciencedirect.com/science/article/pii/S0048969723011646?via%3Dihub	May 2023
6	UGENT	Chemical Engineering Journal	A calibrated model approach to cost- efficient nitrogen recovery in manure processing using a two-stage ammonia stripping and nitrification-denitrification system	Ruben Vingerhoets, Claudio Brienza, Ivona Sigurnjak, Jeroen Buysse, Siegfried E. Vlaeminckc, Marc Spiller, Erik Meers	https://www.sciencedirect.com/science/article/pii/S1385894723057157#f0025	December 2023
7	UMIL	Scientific Reports	Effects of the application of microbiologically activated bio-based fertilizers derived from manures on tomato plants and their rhizospheric communities	Elisa Clagnan, Mirko Cucina, Patrizia De Nisi , Marta Dell'Orto, Giuliana D'Imporzano, Roberto Kron-Morelli, Laia Llenas-Argelaguet Fabrizio Adani	https://www.nature.com/articles/s41598-023-50166-5#:~:text=Benefits%20of%20microbially%20activated%20bio,fertilized%20and%20chemically%20fertilized%20plants	December 2023
8	FHR	Verband Deutscher Landwirtschaftlicher Untersuchungs- und Forschungsanstalten (VDLUFA Kongress)	Prüfung der Eignung von Biokohle aus Rindermist als Düngemittel zu Mais im Topfversuch	S. Schönfeld, C. Hartung, E. Westenthanner, T. Reiter, H. Heuwinkel	https://www.vdlufa.de/wp-content/uploads/2024/01/134.VDLUFA-Kongress_2023_Freising.pdf	December 2023

9	UGENT	Resources conservation & recycling	Navigating the Economic Impact of Novel Nutrient Recovery Technologies in Livestock-Intensive Regions (logistic modelling)	Ruben Vingerhoets, Ivona Sigurnjak, Jeroen Buysse, Oscar Schouman, Erik Meers	NA	January 2024
10	UGENT	Journal of Environmental Management	Enhancing swine manure treatment: A full-scale techno-economic assessment of nitrogen recovery, pure oxygen aeration and effluent polishing	Ruben Vingerhoets, Ivona Sigurnjak, Marc Spiller, Siegfied E. Vlaeminck, Erik Meers	https://www.sciencedirect.com/science/article/pii/S0301479724006327?dgcid=author	March 2024
11	UGENT/UVIC	Scientia Horticulturae	Evaluation of agronomic efficiency and stress resistance on Swiss chard via use of biostimulants	Vaibhav Shrivastava, Nimisha Edayilam, Berta Singla Just, Omar Castaño-Sanchez, Laura Díaz-Guerra, Erik Meers	https://doi.org/10.1016/j.scienta.2024.113053	April 2024
12	UGENT	Science of the Total Environment	Use of Ammonium Nitrate and Ammonium Sulphate in circular agriculture: A compilation of results from 4 year field trials	Vaibhav Shrivastava, Tomas Van De Sande, Ivona Sigurnjak, Erik Meers	N.A.	May 2024
13	UVIC	Agronomy	Phosphorus release dynamics from ashes during a soil incubation study: effect of feedstock characteristics and combustion conditions	Berta Singla, Pablo Binder, Nagore Guerra, Laura Díaz, Rosa Vilaplana, Nicola Frison, Erik Meers, Laia Llenas and Ana Robles	https://doi.org/10.3390/agronomy14050935	April 2024
14	UVIC	International Journal of Agricultural Sustainability	Biofertilization increases soil organic carbon concentrations: results of a meta-analysis	Berta Singla, Evan Marks, Laura Roquer Sergio Ponsá, Laia Llenas and Rosa Vilaplana	Under revision	June 2024

15	WUR	Applied studies	Environmental effects of using ammonium sulfate from animal manure scrubbing technology as fertilizer	René Rietra 1*, Kimo van Dijk1 , and Oscar Schoumans1	https://doi.org/10.3390/app14124998	June 2024

ANNEX II Publication in magazines

	Proposed by	Magazine name	Title/topic	Date of publication	Link to the publication
1	APCA	Réussir Terra	FERTIMANURE, a project to optimize manure management	03/07/2020	https://www.calameo.com/books/00611278533152acf4e68
2	APCA	Paysan Lorrain	Pour des sols efficaces, dotés d'une fertilité biologique durable	04/09/2020	https://www.le-paysan-lorrain.fr/
3	UVIC	Open access government	FERTIMANURE From farm to market-upcycling manure to improved fertilising products pg 242	09/10/2020	https://edition.pagesuite-professional.co.uk/html5/reader/production/default.aspx?pubname=&edid=f10cf98f-85a8-453f-a44f-a855861878cc
4	UVIC	RETEMA	Estrategias innovadoras de valorización de deyecciones ganaderas para producir nuevos fertilizantes en la UE PG - page 118	17/09/2021	https://www.retema.es/revista-digital/especial-bioenergia-7
5	APCA / RITTMO	Le Paysan Vosgien	First results of the FERTIMANURE project	01/10/2021	https://grandest.chambre-agriculture.fr/publications/toutes-les-publications/la-publication-en-detail/actualites/premiers-retour-du-projet-europeen-fertimanure/
6	INTA	Solo Aves y Porcinos	Nuevas Tecnologías para tratar y dar valor agregado a los residuos ganaderos. Crespo, D.C; Beily, M.E y Bres, P.A. Año XV, N°9 - page 10	01/10/2021	https://www.calameo.com/read/005800297e67b1549b839
7	DARP / UVIC	Agrodiario.com	Notícia:Cataluña pone en marcha una planta piloto que valoriza deyecciones ganaderas	24/01/2022	https://www.agrodiario.com/texto-diario/mostrar/3414485/cataluna-pone-marcha-planta-piloto-valoriza-deyecciones-ganaderas
8	INTA	Producir XXI	Agregando más valor a los residuos del tambo - page 26	20/04/2022	https://producirxxi.com.ar/revista-abril-no-366/
9	APCA	Le Mag des agriculteurs de Bretagne (#02)	Test d'un pyrolyseur mobile à Kerguéhennec - Recycler du fumier de volaille en biochar -page 24	01/06/2022	https://www.calameo.com/read/00262679310c015e6411c
10	LEITAT	Eueropean Sustainable Phosphorus Platform -	Recovery of Nitrogen and Phosphorus from Livestock Slurry through membrane technologies - page 113	20/06/2022	https://www.phosphorusplatform.eu/images/Conference/ESPC4/ESPC4%20PERM5%20-%20Book%20Of%20Abstracts%20-%20Final.pdf

		Book of abstracts			
11	INTA - UVic	Producir XXI	Productos biofertilizantes a partir de deyecciones ganaderas. Pages 32 - 35	01/02/2023	https://producirxxi.com.ar/revista-febrero-n376/ .
12	WENR	Policy brief	Evaluation of the nitrates Directive, A scientific response	08/03/2024	https://www.wur.nl/nl/show/policyletter-nitrates-directive.htm
13	INTA	INTA Informa	La Argentina, con alto potencial para producir fertilizantes biológicos	15/03/2024	https://www.argentina.gob.ar/noticias/la-argentina-con-alto-potencial-para-producir-fertilizantes-biologicos
14	INTA	Revista Chacra	Impulsan la reutilización eficiente del estiércol	15/03/2023	https://www.revistachacra.com.ar/nota/50370-impulsan-la-reutilizacion-eficiente-del-estiercol/
15	FHR	TopAgrar	Pflanzenkohle aus Reststoffen: Hohe Qualität in der Forschung nachgewiesen / Biochar from residues: High quality proven in research	16/01/2024	https://www.topagrar.com/perspektiven/nachhaltigkeit/pflanzenkohle-aus-reststoffen-hohe-qualitaet-in-der-forschung-nachgewiesen-13567474.html
16	WENR	NRC handelsblad	Is er een uitweg voor de mestcrisis?	24/04/2024	Is er een uitweg voor de mestcrisis?
17	WENR	Klimaat-HelpDesk	FAQs climate helpdesk about manure versus synthetic N (general public)	10/01/2022	Waarom gebruiken we nog kunstmest, terwijl we in Nederland een mestoverschot hebben? | KlimaatHelpdesk
18	APCA	Le Mag des agriculteurs de Bretagne (#21)	Fumier et lisier : des procédés pour récupérer leurs éléments fertilisants – page 20&21	01/05/2024	https://bretagne.chambres-agriculture.fr/fileadmin/user_upload/National/FAL_commun/publications/Bretagne/PDF/LeMag/MAG_21_BD.pdf

ANNEX III - Presentations in conferences and fairs

	Name	Number of participants	Date	Audience	Partner involved	Place	Type of activity
1	FERTIMANURE project presentation	25	9-01-2020	INTA scientific researchers	INTA	Face to face	Organization of a workshop by INTA
2	ELO Innovation Conference Climate Positive Farming	20	29-01-2020	Policy makers and researchers	ELO	Online	Participation to a conference
3	Working Group Meeting for Rural Youth Europe	100	29-01-2020	CEJA, DG AGRI, Rural Youth Europe, EUROPARC	ELO	Face to face	Participation to a workshop
4	Wildlife Estates Dinner	150	10-02-2020	Wildlife Estates and ELO Members	ELO	Face to face	Participation to an event
5	FERTIMANURE project presentation	67	10-02-2020	INTA members and Agricultural producers	INTA	Online	Organization of a conference by INTA
6	ELO General Assembly	50	15-06-2020	ELO members	ELO	Online	Participation to an event
7	Friends of the Countryside General Assembly	82	24-06-2020	FCS members	ELO	Online	Participation to an event
8	Presentación PIUNAHUR-Cooperación Universidad de Hurlingham (UNAHUR)	100	19-11-2020	Environmental and Agricultural career professionals and students	INTA	Online	Participation to a workshop

9	2nd edition of ESNI 2020 Conference	128	26-11-2020	Researchers and scientist, EU projects and policy makers	UVic-UCC	Online	Participation to a conference
10	HEPH-Condorcet course programme	14	27-11-2020	Students (Agronomy and International Development)	GWIN	Online	Participation to an event
11	ELO General Assembly	50	2-12-2020	ELO members	ELO	Online	Participation to an event
12	EPC Meeting	40	27-01-2021	ELO Policy and members	ELO	Online	Participation to an event
13	FFA Brussels – Month of March	3000	22-03-2021	Agricultural producers, Fertiliser producers, Academia and research, Business and financial advisors and Public entities	ELO	Online	Participation to a conference
14	Congrés BIT2000	80	24-03-2021	Academia and research	CPV	Face to face	Participation to a conference
15	BIO-raffiniert XI	40	24/25-03-2021	Researchers and scientist, Fertiliser producers	FHR	Online	Participation to an event
16	Manuresource conference	100	11/12-05-2021	Agricultural producers, Fertiliser producers, Academia and research, Business and financial advisors and Public entities	IPS	In person	Presentation at the conference

17	PERM4 – 4th Phosphorous in Europe Research Meeting	150	2-06-2021	Different stakeholders that are part of the ESPP. Mainly Academia and research, and Companies	UVic-UCC	Online	Participation to a conference
18	Technical talks on circular economy applied to pig farming	15	20/21-06-2021	Pig farmers and cattle farming professionals	INTA	Face to face	Organization of a workshop by INTA
19	Jornadas PATT	100	30-06-2021	Policy makers, farmers and industry represnetatives	UVic-UCC	Online	
20	EU & Research projects: CIRCULAR ECONOMY & ENVIRONMENT	70	02-07-2021	Fertiliser processing industry, Adacemia and research, Policy makers and authorities	UVic-UCC	Virtual	Participation to a workshop
21	Compostaje de Residuos Orgánicos Municipales .Recursos Naturales y Ambiente	57	25-08-2021	Agricultural producers, Fertilisers processing industry, Academia and research	INTA	Virtual	Participation to a workshop
22	II Noche Iberoamericana de los Investigadores (IIN). Noche Europea de los Investigadores.	1000	24-09-2021	Agricultural producers, Fertilisers processing industry, Academia and research	INTA	Hybrid: virtual and face to face	Participation to an event
23	H2020 - FERTIMANURE - de la ferme au marché : valoriser le fumier en produits fertilisants améliorés	15	19-10-2021	Agricultural producers, Fertiliser producers	GWIN / Uvic -UCC	Virtual	Organisation of a conference

24	INNAGRO 2021 – ENCUENTRO DE INNOVACIÓN AGROALIMENTARIA	200	19-10-2021	Academia and Research, Public Entities	UVic-UCC	Virtual	Participation to a conference
25	III SIMPOSIO DE RESIDUOS AGROPECUARIOS Y AGROINDUSTRIALES DE NOA Y CUYO	200	28-10-2021	Academia and Research, Public Entities	UVic-UCC	Virtual	Participation to a conference
26	Fertilizers Europe workshop	36	29-10-2021	Fertiliser producers (16 of its members)	Fertilizers Europe	Virtual	Organisation of a workshop
27	Mid-Term review of the French Circular Economy Program	50	10-11-2021	Fertilisers processing industry, Policy makers and authorities	APCA	Virtual	Participation in activities organised jointly with other H2020 projects
28	European Biosolids & Bioresources Conference	200	16-11-2021	Academia and research	FHR	Virtual	Participation to a conference
29	COMIFER-GEMAS	260	24-11-2021	Fertilisers processing industry, Policy makers and authorities, Academia and Research	APCA	Face to face	Participation to an event
30	Contrast session with actors in the agri-food sector (Sessió de contrast amb actors del sector agroalimentari)	20	01-12-2021	Agricultural producers, Fertiliser producers, Business and financial advisors, Public entities, Policy makers and authorities	UVic-UCC	Face to face	Organisation of a conference

31	Brainstorm session 1	21	02-12-2021	Agricultural producers, Fertilising processing industry, Public entities and general public	IPS	Virtual	Orgainsation of a webinar
32	Cross-H2020-seminar Lex4bio & FERTIMANURE	50	09-12-2021	Academia and Research	UVic-UCC / WENR /	Virtual	Participation in activities organised jointly with other H2020 projects
33	Inauguration of the Spanish pilot plant by the Catalan Minister	25	21-01-2022	Agircultural producers, Policy makers and authorities	UVic-UCC	Face to face	Organisation of a conference
34	Valorizzazione microbiologica delle biomasse da allevamenti animali in ambito agricolo all'interno del progetto FERTIMANURE	35	01-02-2022	Fertiliser producers and Academia and research	UMIL / Agrifutur	Virtual	Organisation of a workshop
35	CICLO DI SEMINARI DI AGGIORNAMENTO SULLA CONCIMAZIONE ORGANICA	30	16-02-2022	Academia and research	UMIL	Hybrid: face-to-face and virtual	Participation to a conference
36	Development of bio-based fertilisers for a circular bioeconomy	50	16-02-2022	Academia and research	UVic-UCC	Virtual	Participation to a conference
37	Forum for the Future of Agriculture Belgium	400	15-03-2022	Policy makers and authorities	ELO	Virtual and Face to face	Participation to a conference
38	Water2REturn Final Conference: nutrients recovery in the meat industry	55	21-03-2022	Academia and research	UVic-UCC	Virtual	Participation to a conference

39	Bio360 Expo	200	30-03-2022	Agricultural producers, Fertiliser processing industry, Academia and research	RITTMO	Face to face	Participation to an event
40	Introductory meeting of the Working Group on technologies for nutrient recovery of NRC (Nutrient Recycling Community)	20	29-04-2022	Academia and research	UMIL	Virtual	Participation in activities organised jointly with other H2020 projects
41	1st Large-scale event - MANURESOURCE conference	50	12-05-2022	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers and authorities, Public entities and general public	ALL	Face to face	Organisation of an event
42	PRO-FEM	200	18-05-2022	Agricultural producers, Fertiliser producers, Business and financial advisors, Public entities, and Policy makers and authorities, Academia and research	DACC	Face to face	Participation to an event
43	57th Croatian and 17th International Symposium on Agriculture	600	21-06-2022	Academia and research	IPS	Face to face	Participation to a conference
44	4th European Sustainable Phosphorus Conference 2022	100	22-06-2022	Academia and research, Fertiliser producers, Business and financial advisors, Policy makers and authorities	LEITAT	Face to face	Participation to a conference

45	Field - Demo Day	15	30-06-2022	Agricultural producers	DACC and UVIC-UCC	Face to face	Other - Demo day
46	Brainstorm session 2	9	8-07-2022	Agricultural producers, Fertilisers processing industry, Business and financial advisors, Public entities and general public	IPS	Virtual	Organisation of a webinar
47	FERTIMANURE: Upcycling animal manure into improved fertilising products in the Global Symposium Conference (organised by FAO)	80	27-07-2022	Academia and research	UVic-UCC	Virtual	Participation to a conference
48	National Project Meeting (INTA) PDI518: Advances and achievements of pollution and added-value s	60	11-08-2022	Academia and research	INTA	Face to face	Organisation of a conference
49	2 do BRAINSTORM SESSION. jornada de “Tecnologías de tratamiento para recuperación de nutrientes a partir de efluentes y agropecuarios y la producción de bioinsumos para uso agronómico	92	06-09-2022	Agricultural producers, Fertiliser producers, Business and financial advisors, Public entities, and Policy makers & authorities, Academia and research	INTA	Virtual	Participation to a conference
50	Seminario “Tecnologías de tratamiento para recuperación de nutrientes a partir de efluentes agropecuarios y la producción de bioinsumos para uso agronómico”.	87	06-09-2022	Academia and research	UVic-UCC	Virtual	Participation to a conference

51	Field day	15	15-09-2022	Agricultural producers	DACC	Face to face	Other - Demo day
52	EU Circular talks	50	05-10-2022	Academia and research	UVic-UCC	Virtual	Participation to a conference
53	ECOMONDO	50	09-11-2022	Academia and research	UVic-UCC / IPS	Face to face	Participation to a conference
54	RENOWAGRO	700	14-11-2022	Academia and research	UVic-UCC / FERT	Face to face	Participation to a conference
55	XIV Encuentro de la RedBioLAC (Red de Biodigestores para America Latina y El Caribe)	60	22-11-2022	Fertiliser producers, Academia and research, Policy makers and authorities	UMIL	Face to face	Participation to a conference
56	The Signpost Series	248	25-11-2022	Agricultural producers, Fertiliser processing industry, Academia and research, Policy makers and authorities	WENR / RITTMO	Virtual	Participation to a conference
57	Project promotion with pig and dairy producers in the Santa Fe region.	10	29-11-2022	Agricultural producers	INTA	Face to face	Organisation of a conference
58	Forum for the Future of Agriculture	300	02-12-2022	Policy makers and authorities	ELO	Virtual and Face to face	Participation to a conference
59	3rd International Conference Strategies toward Green Deal	40	05-12-2022	Academia and Research, Public Entities	UGENT	Virtual	Participation to a conference

	Implementation Water, Raw Materials & Energy						
60	Cross – H2020 – seminar LEX4BIO & FERTIMANURE Bio-based fertilizers of the Future	50	07-12-2022	Academia and research	UVic-UCC	Virtual	Participation in activities organised jointly with other H2020 projects
61	Presentation of the results of the FERTIMANURE project	9	12-12-2022	Agricultural producers	FERT	Face to face	Organisation of a conference
62	Forum for the Future of Agriculture	800	03-04-2024	Policy makers and authorities	ELO	Virtual and Face to face	Participation to a conference
63	58th Croatian and 18th International Symposium on Agriculture	500	15-02-2023	Academia and research	IPS	Face to face	Participation to a conference
64	2doLarge-scale event – Argentina- conference	100	13-03-2023	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers and authorities, public entities and general public	All	Face to face and virtual	Organization by INTA
65	Brainstorming with farmes and agricultural producers in ADECOARGRO (Santa Fe – Argentina) RECUPERACIÓN INNOVADORA DE NUTRIENTES A PARTIR DE FUENTES SECUNDARIAS - PRODUCCIÓN DE FERTILIZANTES DE ALTO	60	09-03-2023	Agricultural producers, Farmers	ALL	Face to Face	Organization by INTA

	VALOR AÑADIDO A PARTIR DE ESTIÉRCOL ANIMAL						
66	Brainstorming with medium farmers and agricultural producers in INTA Arrecifes. RECUPERACIÓN DE NUTRIENTES A PARTIR DE ESTIÉRCOLES ANIMALES Y ENSAYOS DE USO AGRONÓMICO	50	10-03-2023	Agricultural producers, Farmers, Academia and research	All	Face to Face	Organization by INTA
67	IV SIMPOSIO DE RESIDUOS AGROPECUARIOS Y AGROINDUSTRIALES	200	03-11-2023	Academia and Research, Public Entities	UVic - INTA	Virtual and Face to Face	Participation to a conference
68	Webinar: FERTIMANURE Sustainable biofertilizers and their adoption in the CELAC Region	90	06-07-2023	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers and authorities, public entities and general public	UVic- Leitat – INTA - IPS	Virtual	Webinar Organization by INTA, Leitat Chile, IPS and UVic
69	Webinar: New results of the FERTIMANURE project and its transfer to CELAC	100	06-07-2023	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers and authorities, public entities and general public	UVic- Leitat – INTA – IPS-Fertinagro	Virtual	Webinar Organization by INTA, Leitat Chile, IPS and UVic
70	VDLUFA-Kongress	300	05.– 08-09-2023	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers and authorities, public entities and general public	FHR	In Person	Poster Presentation

71	ESNI conference	60	20-09-2023	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers and authorities, public entities and general public	IPS	In Person	Presentation at conference
72	Webinar: Exploring market opportunities for technologies and products developed within the Fertimanure project	29	28-11-2023	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers and authorities, public entities and general public	Fertilizer Europe - IPS	Online	Webinar organization by Fertilizer Europe and IPS
73	Ecomondo	100	07-11-2023	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers and authorities, public entities and general public	FHR	In person	Presentation in session at Ecomondo
74	Online Workshop - Best Practices to apply to European Research and Innovation Funds to foster Cooperation between Bavaria and South America on Green Topics. H2020 FERTIMANURE Fertimanure fertilising products: Biorefineries for recovering nutrients from animal manure	50	16-01-2024	Academia and research	INTA	Online	Participate in a Workshop
75	SOFIE conference		17-01-2024	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers	IPS/UGENT/APF	In person	Presentation at conference

				and authorities, public entities and general public			
76	Progress in Manure & Digestate	50	23 – 25-01-2024	Agricultural & Academia research, Industry, Agricultural producers	FHR	Online	Presentation at Conference
77	Organisation of 2 round tables – Manuresource conference	19	21-03-2024	Agricultural & Academia research, Industry, Agricultural producers	Fertilizer Europe - IPS	In person	Organisation of a workshop
78	Manuresource conference	100	21-03-2024	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers and authorities, public entities and general public	IPS	In person	Presentation at conference
79	NERM – final event	120	16/17-04-2024	Agricultural producers, Fertilisers processing industry, Academia and research, Policy makers and authorities, public entities and general public	All	In person	Organisation/ presentation at conference
80	Assises Nationales du Biochar	150	29-03-2023	Fertilisers processing industry, Academia and research, Policy makers and authorities, public entities	APCA - RITTMO	Face to face	Presentation at conference
81	COMIFER-GEMAS	420	21/22-11-2023	Fertilisers processing industry, Policy makers and authorities, Academia and research.	APCA - RITTMO	Face to face and online	Presentation at conference

82	JOURNEES DE LA RECHERCHE PORCINE	400	06/07-02-2024	Policy makers and authorities, Academia and research.	APCA - RITTMO	Face to face and online	Presentation at conference
83	JOURNEES DE LA RECHERCHE AVICOLE ET PALMIPEDES A FOIE GRAS	300	20/21-03-2024	Policy makers and authorities, Academia and research.	APCA - RITTMO	Face to face	Presentation at conference
84	Webinar “Je m’approprie les projets européens - Episode 1 : L’Europe, un terreau fertile pour les nouvelles matières fertilisantes ?”	30	23-05-2024	French Chambers of Agriculture members	APCA	Virtual	Presentation at webinar
85	5th IWA Resource Recovery Conference	200	1 – 3-11-2023	Academia and Research, Public Entities	UGENT	Face to Face	Presentation at conference
86	17th International European Forum on System Dynamics and Innovation in Food Networks (Igls-Forum)	50	13 – 17-02-2024	Academia and Research, Public Entities	UGENT	Face to face	Presentation at conference
87	ELLS Bioeconomy Summer School, Uppsala, Sweden	30	31-07 – 13-08-2023	Academia and Research, Public Entities	UGENT	Face to face	Poster and presentation in summer school
88	Nutri2Cycle Summer School, Barcelona, Spain	40	07 – 09-06-2023	Academia and Research, Public Entities	UGENT	Face to face	Poster at summer school

ANNEX IV – Posters presentations

Manuresource 2021, 11 & 12 May, 2022, ‘s Hertogenbosch, The Netherlands - Quantification of the nitrogen and phosphorus flows in the Flemish agro-food chain to enhance manure management and nutrient recovery
Biorefine Conference ‘The role of biorefineries in European agriculture’, 30 & 31 May 2022, Ghent, Belgium - Quantification of the nitrogen and phosphorus flows in the Flemish agro-food chain to enhance manure management and nutrient recovery
3rd Nutri2Cycle Summer School, 7-8-9 June, 2023, Barcelona, Spain - Ammonia Water as a Synthetic Fertiliser Substitute in *Lactuca Sativa L.* Production
ELLS Bioeconomy Summer School, 31st July - 13th August 2023, Uppsala, Sweden - Sustainable Agriculture for Zero Hunger.
4th European Sustainable Nutrient Initiative Coonference, 20th - 21st September 2023, Brussels, Belgium - Ammonia Water as a Synthetic Fertiliser Substitute in *Lactuca Sativa L.* Production.
Fertimanure Final Event in Brussels – NERM Event (April 2024). Fertimanure main achievments

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2. EU Project Websites. (2010) *Best Practice Guideline (http://www.eurosfaire.prd.fr/7pc/documents/1271333123_project_website_guidelines_en.pdf)*
3. Grant Agreement Fertimanure NUMBER 862849. EUROPEAN COMMISSION Research Executive Agency
4. Scherer, J. (2017). *Adresssing Impact and Exploitation in Horizon 2020 proposals European IPR*

FERTIMANURE

INNOVATIVE NUTRIENT RECOVERY FROM SECONDARY SOURCES-PRODUCTION OF HIGH-ADDED VALUE FERTILISERS FROM ANIMAL MANURE

PROJECT COORDINATOR

Fundació Universitària Balmes (Spain)

CONSORTIUM

Ghent University (Belgium)
Wageningen Environmental Research (The Netherlands)
University of Milan (Italy)
Leitat (Spain)
GreenWin (Belgium)
European Landowners Organisation (Belgium)
IPS Konzalting (Croatia)
Fraunhofer (Germany)
Dorset Green Machines (The Netherlands)
Prinsen Dairy Company (The Netherlands)
French Chamber of Agriculture (France)
Cooperativa Plana de Vic (Spain)
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PROJECT WEBSITE:

https://www.fertimanure.eu

Brief project summary

The mission of the FERTIMANURE project is to provide innovative solutions (technology, end-products, and business models) that solve real issues, i.e. the manure challenge, and help farmers with the challenges that they are currently facing. FERTIMANURE will develop, integrate, test and validate innovative nutrient management strategies so as to efficiently recover and reuse nutrients and other products with agronomic value from manure, to ultimately obtain reliable and safe fertilisers that can compete in the EU fertiliser market.
The FERTIMANURE project will cover both technological and nutrient management approaches. The technological side will be addressed with the implementation of 5 innovative and integrated on-farm experimental pilots for nutrient recovery in the most relevant European countries in terms of livestock production (Spain, France, Germany, Belgium, The Netherlands), whereas nutrient management will be addressed through 3 different strategies adapted to mixed and specialised farming systems:
Strategy #1 with on-farm production and use of bio-based fertilisers (BBF)(1) , **Strategy #2** with on-farm BBF production and centralised tailor-made fertilisers (TMF)(2) production, and **Strategy #3** with on-farm TMF production and use.

Definition of Bio-based fertilisers (BBFs): *Bio-based fertilisers (BBFs) are fertilising products or a component to be used in the production of (Tailor-Made) Fertilisers that are derived* ***from biomass-related resources.***

The BBFs of FERTIMANURE are "obtained through a ***physical, thermal/thermo-chemical, chemical, and/or biological processes for the treatment*** *of manure or digestate that result into a change in composition due to a change in concentration of nutrients and their ratios compared to the input material(s) in order to get better marketable products providing farmers with nutrients of sufficient quality".*

However, just separation of manure in a solid and liquid fraction (as first processing step) is excluded. These products are not conceived as a BBF, although they are valuable sources to supply nutrients on agricultural land.

LIST OF BBFs Produced in FERTIMANURE

Number	BBF-code	BBF product description
1	NL-AS	Ammonium sulphate solution
2	NL-LK	Liquid K-fertiliser
3	NL-SC	Soil conditioner
4	NL-WP	Wet organic P-rich fertiliser
5	NL-DP	*90% dried organic P rich fertiliser (calc)*
6	ES-NC	Nutrient-rich concentrate
7	ES-DSC	Bio-dried solid fraction
8	ES-PA	Phosphorous (ashes)
9	ES-AM	Ammonium salts
10	ES-AA	AA-based biostimulants
11	DE-BC	Biochar (solid)
12	DE-AP	Ammonium phosphate on perlite (solid)
13	BE-AN	Ammonium nitrate
14	BE-AS	Ammonium sulphate
15	BE-AW	Ammonium water
16	FR-BC	Biochar
17	FR-AS	Ammonium sulphate
18	FR-LK	Liquid K-fertiliser

Definition of Tailor-Made Fertilisers (TMFs): *A tailor-made fertiliser (TMF) is a customized fertiliser that meets with the nutrient requirements of a specific crop by taking into account the soil type, soil fertility status, and growing conditions and fertilisation practises.*

The TMFs obtained in FERTIMANURE are produced from BBFs (produced from manure or digestate and/or other recovered fertilising products that are available) and/or mineral fertilisers (MF) (and/or biostimulants).

Fully crop specific TMFs can be defined and centrally produced assuming e.g. a sufficient nutrient status of a soil type and no additional fertilisation practice.

However, on farm level the soil-crop requirements will be different due to another nutrient status of the soil and the fact that often manure/digestate will be applied on the fields which has to be taken into account as nutrient supplier. Consequently, the composition of the TMF (combination of BBF and MF) that will be used by the farmer can differ from the one produced in a centralised way.