D3.2. Guidelines for fertiliser producers

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List of Acronyms

CAP	Common Agriculture Policy
ECN	European Compost Network
GPP	Green Public Procurement
LCA	Life Cycle Assessment
NIMBY	Not In My BackYard

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Keywords list

- Recommendations
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- Circular fertilisers
- Fertiliser producers
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- Circular fertilisers value chains
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- Sewage sludge
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Executive summary

FER-PLAY is working to protect ecosystems, decrease EU dependence on fertiliser imports and improve resource efficiency through the promotion of circular fertilisers. The project objective is to map and assess circular fertilisers made from waste, wastewater and by-products, highlighting their multiple benefits to foster their wide-scale production and application.

The project work plan foresees a dedicated Work Package to gather first-hand perspectives from key stakeholders regarding barriers and opportunities for circular fertilisers deployment following a co-creation approach. Relevant stakeholders representing mainly the three target groups (end-users, fertiliser producers and local administrations) and describing a variety of EU countries perspectives, are involved into discussions with the main scope of feeding FER-PLAY with a wider range of viewpoints that cover real needs and that can be later reflected on the main outcomes of the project: the assessment of impacts and trade-offs of the selected value-chains (resulting from WP2 “Multi-assessment of impacts, trade-offs and framework conditions of selected alternative fertiliser value chains”), the tailor-made guidelines (resulting from WP3 “Co-creation of favourable conditions for the uptake of circular fertilisers”) and the awareness-rising activities (part of WP4 “Dissemination, exploitation and communication”).

Project deliverables D3.1, D3.2 and D3.3 collect a set of guidelines and recommendations for the three target groups gathered during these co-creation discussions carried out from March 2023 to September 2024 and completed by partners experience. These deliverables are available in the project “Resources” webpage and soon also in FER-PLAY Zenodo community.

In particular, the present document displays a set of key messages addressed to support circular fertiliser producers to overcome technical and non-technical barriers that may hamper the uptake of their product in the market. The headlines of the recommendations the producer will find in this document are:

Good commercial strategies for the uptake of circular fertilisers in the market:

- Give the proper market value to your fertiliser product.
- Build an integrated selling system that provides technical support and machinery for best practices in applying fertilisers.
- Plan with farmers the amount of fertiliser and the period of the year according to the agronomic needs of the crops.
- Consider alternative market destinations of the product, different from that of arable land.

- Organic Farming can be a pivotal market sector for circular fertilisers.
- Circular fertilisers in Green Public Procurement and the role of the Public Administration as key customer.
- Adopt voluntary Quality Assurance Schemes (QAS).

Recommendations to build trust on the end-users and on the general society:

- Ensure transparent communication on product quality.
- Strategies to communicate the benefits of circular fertilisers.
- Collaborate with universities and research centres to foster research on your product.
- Join trade associations.

How to gain local acceptance for the settlement of a fertiliser production facility in the territory:

- Fight against the "Not In My BackYard" attitude.

1. Introduction

FER-PLAY is a Horizon Europe project facilitating the uptake of circular fertilisers, to protect ecosystems, decrease EU dependence on fertiliser imports, foster circularity and improve soil health. The project goal is to map and assess circular fertilisers made from waste, wastewater and by-products (such as manure, compost from bio-waste and struvite from sewage sludge treatment) as well as to highlight their multiple benefits in order to promote their wide-scale production and use on field.

In the first part of the project, 7 value chains corresponding to the production and application of 7 circular fertilisers were selected to undergo a multi-assessment of impacts and trade-offs at economic, regulatory, social and environmental level compared to the production and use of conventional fertilisers. The results of these project activities are available in D1.1 "Comprehensive overview on circular fertiliser value chains" and D2.2 "Multi-assessment of impacts, trade-offs and framework conditions of selected alternative fertiliser value chains"

In parallel, FER-PLAY has dedicated an important effort to understand the different perspectives and concerns of the three key stakeholder groups: fertiliser end-users, producers and public administration. To this aim, a specific Work Package has been dedicated to cover these discussions and the approach selected as most suitable was to follow co-creation principles, meaning to systematically share, mobilise and activate knowledge[1].

The experience of the FER-PLAY consortium members along with the feedback gathered through these co-creation activities have led to the elaboration of three guidelines (included in D3.1 "Guidelines for fertiliser end-users", D3.2 "Guidelines for producers" and D3.3 "Recommendations for Public Administrations"). The outcomes received from the co-creation events have been further expanded and tuned to provide an answer to those questions that most commonly arise from the producers of circular fertilisers, the end-users (mainly the agriculture sector but also companies dedicated to green spaces maintenance, growing media producers, etc.) and the Public Administrations.

The present document addresses the circular fertiliser producers and has been designed as a compilation of messages and strategies that may contribute to solve the main hurdles that they encounter when approaching the market. It has been structured in three main blocks of recommendations addressing: (1) successful strategies to enhance the commercialisation and market value of the fertiliser product (see chapter 2), (2) instruments to build trust on the end-user and on the general society (see chapter 3), (3) considerations to overcome barriers for the

[1] Triste, L. September 2018. Communities of practice for knowledge co-creation on sustainable dairy farming.

settlement of the production facility (see chapter 4). In most cases, the information is completed by real cases that exemplify the messages provided.

The set of three guidelines are available in the Resource section of the FER-PLAY website and on Zenodo and will be further disseminated to the target audience through different channels.

2. Good commercial strategies for the uptake of circular fertilisers in the market

2.1. Give the proper market value to your product

In some cases, the main revenue obtained by circular fertiliser producers is not linked to the fertiliser itself but to the service they provide managing and treating the feedstock. It might be the case for example for the producers of compost and solid digestate out of bio-waste or of the producers of struvite out of wastewater.

Due to these revenue streams, producers might reduce the emphasis on marketing the fertiliser effectively, selling the circular fertiliser at a low price or even give it away for free. However, this approach has significant negative implications:

- **Harmful to the sector**. Undervaluing the fertiliser undermines the economic sustainability of producers. It also devalues the entire sector, creating an impression that these fertilisers are worth less than their actual value.
- **Distorted perception of quality**. When fertilisers are given away for free or at a low price, farmers may perceive them as a product with inferior quality or even harmful to the soil. This misconception persists along the time generating a mistrust on the agriculture sector difficult to overcome.

In other cases, there are significant differences, among producers of the same fertiliser, in the prices of circular fertilisers that often reflects the business models of the producers rather than the actual quality of the product. This discrepancy can be misleading for consumers and detrimental to the market.

Both scenarios are more frequent when the fertiliser producer does not count with a professional agronomist among its staff or as usual collaborator.

Establishing a market value that takes in account nutrients and soil benefits helps in building a sustainable business model. *A balanced approach, that considers all possible revenues from the company activity, can enhance the overall profitability and sustainability of the business.*

2.2. Build an integrated selling system that provides technical support and machinery for best practices in applying fertilisers

Farmers often hesitate to switch to circular fertilisers; these worries stem from the significant changes that new fertilisers might bring to their well-established agricultural practices. To address these concerns and facilitate a smoother transition, a circular fertiliser producer can offer an integrated system that bundles:

- **Expert advice**. An essential component of the bundle is access to agronomists (belonging to the staff or being a usual collaborator) who have in-depth knowledge of the circular fertiliser and its application across various crops. These experts can provide tailored advice, ensuring the fertiliser is used most effectively to ensure the expected crop yield while maintaining soil quality.

- **On-Field agronomic support**. Agronomists should visit farms and possibly perform soil analysis. They can assess the specific needs of each crop and recommend appropriate dosages and timing for fertiliser application, ensuring that the application of the product is the most efficient for the farm and safe for the environment.

- **Transportation services.** Possibly, transportation services can be provided by the fertiliser producer, reducing costs and allowing faster logistics (for example using trucks instead of the regular tractors available to farmers).

- **Support in bureaucratic aspects**. Producers can assist farmers in navigating the bureaucratic processes associated with the application of new fertiliser products. This support includes handling matters related to Common Agriculture Policy (CAP) financing and compliance with the Nitrate Directive and other environmental and health regulations.

REAL CASE: **In Germany some compost producers would do bureaucratic work for the farmer** Navigating bureaucratic processes can be a significant hurdle for farmers wishing to use circular fertilisers. Producers can play a crucial role in easing this burden by providing support with necessary forms and regulatory compliance, particularly with regional offices.

In Germany, it is common for compost producers to handle much of the regional bureaucracy on behalf of farmers. This service is especially valuable given that using circular fertilisers involves compliance not only with agricultural regulations but also with waste management regulations. The interpretation and enforcement of these regulations can vary significantly across different regions and federal states in Germany and sometimes even more locally.

A farmer who wants to use a circular fertiliser on their fields typically needs to obtain permission from their local district office. This is especially necessary for the initial use of such fertilisers. The application process requires several documents, including details about the input materials and quality of the compost or circular fertiliser. Gathering and submitting these documents can be complex and time-consuming.

To alleviate these challenges, many circular fertiliser producers offer to handle the paperwork for farmers. This assistance includes preparing and submitting all required forms and documentation to the relevant regional offices. By taking on this bureaucratic responsibility, producers not only facilitate the adoption of circular fertilisers but also help ensure compliance with all applicable regulations.

This support can significantly streamline the process for farmers, allowing them to focus on their agricultural activities rather than being bogged down by administrative tasks. Moreover, it can foster a positive relationship between the producers and the farming community, demonstrating a commitment to customer service and regulatory adherence.

- **Specific machinery for application.** Proper application of the circular fertiliser on the soil is critical to its effectiveness since it ensures that the product is distributed evenly and effectively, maximising its benefits. If the producer does not own the necessary machinery, they can collaborate with third-party service providers. The key is to ensure that only machinery designed for the specific fertiliser is used, guaranteeing optimal application.

REAL CASE: Italian compost producers offer a commercial bundle including technical support, spreading machinery and compost transport.

Some Italian compost producers, offer a comprehensive service bundle that includes technical support, spreading machinery and compost transport. This company, located in southern Italy, has developed an integrated system covering the entire process, from planning the optimal dose and timing of application of compost to the actual spread on-field itself. In detail, they offer an agronomist to visit the field to determine the appropriate amount of compost in collaboration with the farmer, advising on the suitable doses and periods of application. Once the plan is set, the compost is transported using the company's trucks, along with the necessary machinery for loading and spreading the material on the soil. The company provides three different types of machinery to cover to various needs: two sizes of rear compost spreaders for small and medium/large arable fields, and lateral spreaders for orchards, vineyards, and olive groves. Having specialised machinery for different applications is crucial to achieve the best results in all situations. The price for this all-inclusive service is agreed upon in advance.

This initiative shows that demonstrating professionalism and efficiency in advising and applying the product can generate trust in the farmer, who will recognise the agronomic

competence of the producer rather than perceiving the company merely as a waste disposer.

Figure 1. Picture of transport and spreading of compost carried out by trucks and specific machinery owned by the compost producer company. Service offered by Calabra Maceri e Servizi.

2.3. Plan with farmers the amount of fertiliser and the period of the year according to the agronomic needs of the crops

Understanding seasonal fertiliser demand. Farmers typically require fertiliser inputs at specific times of the year, closely aligned with the planting and growing cycles of their crops. This seasonal demand means that the need for fertilisers can be concentrated in a few key periods, such as pre-seeding and during critical growth stages. To meet these agronomic needs effectively, circular fertiliser producers must carefully plan their production and logistics schedules.

Continuous production challenges. Circular fertiliser producers face the dual challenge of maintaining a steady production rate throughout the whole year due to industrial process needs and regular input of feedstock, while also accurately forecasting the amount of product required by farmers. This continuous production can result in periods of surplus, where large quantities of fertiliser are stocked, awaiting peak demand times. Effective inventory management is crucial to avoid storage problems and ensure product availability when farmers need it most. Without precise sales planning, producers risk misaligning their production with fluctuating demand, leading to either excess inventory or shortages during critical periods.

A practical solution to these challenges is establishing yearly sales contracts between farmers and fertiliser producers. By planning with farmers and establishing yearly sales contracts, circular fertiliser producers can better manage their production cycles, reduce inventory challenges and meet the agronomic needs of farms effectively. *This strategic approach not only benefits the producers by stabilising their operations but also supports farmers in achieving optimal crop yields with timely and adequate fertiliser supply.*

This solution could be extended to an arrangement between the fertiliser producers and farmers to receive the agricultural waste for the aim to use as input for circular fertiliser production. The producer will benefit from a constant supply of input of known quality, while reinforcing the relationship of trust with the agriculture sector.

REAL CASE: in the Island of Krk in Croatia, the olive producers receive the compost generated by the residues of the olive oil extraction while the compost producers benefit from a constant feedstock supply.

Organic batches. Since some circular fertilisers can be used in organic agriculture (see chapter *2.5* dedicated to organic farming), the producer may decide to approach both markets, the traditional farming and the organic one. In this case, due to possible restrictions on the feedstock or on the final product quality (e.g. heavy metal content), strict protocols separating the batches and an appropriate tracking system are needed to ensure the product availability when the organic end-users need it.

2.4. Consider alternative market destinations of the product, different from that of arable land

The primary market for circular fertilisers is typically professional agriculture, particularly for yearly herbaceous crops (arable crops). These crops are widespread and require significant amounts of nutrients, making them a natural target for fertiliser producers. However, producers should also consider other lucrative and viable market destinations that can vary based on the type of fertiliser produced.

Horticulture. Horticulture is a sector of great importance for the fertiliser market. Due to multiple harvests throughout the year, more frequent fertiliser applications are required. Furthermore, the high quality demanded in horticultural products can be supported by improved soil quality, which is often achieved through the use of organic amendments, including renewable fertilisers.

Hobby gardening and vegetable production. While professional farmers constitute the bulk of fertiliser demand, hobby gardeners and small-scale vegetable producers also represent a significant market. Although smaller in scale, this sector can yield higher profits. Hobbyists often seek high-quality fertiliser and soil improvers to achieve the best possible results in their gardens and orchards. They are willing to pay a premium for products that promise enhanced quality products and environmental sustainability. By targeting this market, producers can reach a customer base that values quality and is willing to invest in premium products.

Private recreational green. As described in detail in chapter *2.6* for public green areas, there are also private activities that greatly benefit from the use of circular fertilisers. These include golf courses, soccer fields, private parks, lawns and similar areas. For most of these activities, the highest quality of plants and grass is required, necessitating healthy soil through the use of amendments, including circular fertilisers. Moreover, these sectors are often willing to invest more due to the high added value of these types of businesses.

Orchards, vineyards and olive groves. Perennial crops such as orchards, vineyards and olive groves require lower levels of fertilisation compared to arable crops. Nonetheless, they represent an attractive market for circular fertilisers, which can be used to supply essential nutrients and, in the case of organic options, for mulching both between rows and along the rows themselves. This dual-purpose use increases the appeal of circular fertiliser in these sectors, providing ongoing opportunities for market penetration and growth.

Growing media production. An interesting and increasingly important market for organic soil improvers, such as compost and spent mushroom substrate, is the production of growing media. The decline in peat usage due to economic and environmental concerns has opened up opportunities for high-quality, stable and impurity-free organic alternatives. Producing top-tier growing media can be highly profitable due to its relatively high market prices. This market demands superior products, but the economic benefits can justify the investment in producing and refining these high-quality alternatives.

Organic farming. Organic farming is a sector of increasing interest for fertiliser producers and should be taken in consideration to extend the market outlet (see specific chapter *2.5* dedicated to explore this issue).

***Refining and packaging for higher quality and price**. Certain circular fertilisers can be refined to enhance their quality and market value. For instance, compost and solid digestate can be pelletised or fertilisers can be packed rather than sold in bulk. This refinement process incurs higher costs, but it allows producers to command higher market prices. Packaged products are more convenient and appealing to consumers, especially in retail settings. By investing in refinement and quality improvement, producers can access more lucrative segments of the market and increase their profitability.*

2.5. Organic Farming: a pivotal market sector for circular fertilisers

Organic farmers in the European Union face stringent regulations under the EU organic Regulation 2018/848, which prohibits the use of chemical fertilisers. This creates an urgent need for alternative nutrient sources to maintain soil fertility and productivity. Many organic arable and

livestock farms in the EU suffer from negative nutrient balances, particularly in phosphorus (P), which is crucial for plant growth. To address these challenges, circular fertilisers present a viable and promising solution for organic agriculture.

Circular fertilisers, derived from various waste and by-products streams, are permitted in organic farming and offer a sustainable alternative to traditional fertilisers. These fertilisers are particularly valuable when manure, which cannot come from industrial farming and often requires long-distance transportation, is unavailable. Circular fertilisers can efficiently recycle nutrients back into the soil, promoting sustainable agricultural practices.

Organic farming has emerged as a significant market sector in Europe, highlighting the growing importance of sustainable agricultural practices and the demand for circular fertilisers. This sector's expansion is driven by both regulatory targets and market dynamics, making it a crucial outlet for circular fertiliser production. As of 2022, the European agricultural surface allocated to organic farming reached 18.5 million hectares, representing 10.4% of the total farmland in the region. Leading this trend are France, Spain and Italy, which boast the highest surfaces of organic farms within Europe. This expansion is not a recent phenomenon; it has been steadily increasing from about 4.9 million hectares in the year 2000 to the current 18.5 million hectares.

The economic implications of this growth are substantial. In 2022, the value of organic retail sales in Europe was an impressive 53.1 billion euros. This figure not only reflects the consumer demand for organic products but also underscores the market potential for ancillary industries, including the circular fertiliser sector. Finally, supporting this growth is the European Union's strategic vision encapsulated in the Farm to Fork strategy, which aims to allocate 25% of EU agricultural surface to organic farming by 2030.

Given the restrictions on traditional fertiliser use in organic farming said above, circular fertilisers have become a natural and essential alternative. For producers of circular fertilisers, this presents a lucrative market opportunity. The consistent increase in organic farming surfaces, combined with robust market values makes the organic farming sector one of the most interesting for circular fertiliser producers.

For many organic end-users it is not clear which circular fertilisers are allowed in organic farming. For this reason, a cooperation between the organic farming associations, their certification schemes (e.g. Biokreis, Bioland, GÄA, Naturland, etc.) and the certification schemes for circular fertilisers (e.g. ECN-QAS in EU, CIC in Italy, BGK in Germany, KBVÖin Austria and Vlaco in Flanders; *see chapter 2.7)* ***are promising approaches to achieve confidence in circular fertilisers by the organic farmers and to increase their use in the organic farming sector****. In addition, it is important to highlight that circular fertiliser allowed for the use in organic farming are listed in the FiBL operation input material list (an example of the Dutch input list is available HERE).*

2.6. Circular fertilisers in Green Public Procurement and the role of the Public Administration as key customer

The Green Public Procurement (GPP) in the EU is defined as a process of procuring goods, services and works with reduced environmental impact throughout their life cycle. It is a voluntary instrument, allowing Member States to determine the extent to which GPP policies or criteria are applied. GPP is part of the broader framework of Strategic Public Procurement, which also includes Socially Responsible Public Procurement (SRPP) and Innovation Procurement. The core concept of GPP is to establish clear, verifiable, justifiable and ambitious environmental criteria for products and services, based on a life-cycle approach and scientific evidence.

In some EU countries where GPP policies are well-defined, circular fertilisers are included in the list of goods that public administrations are encouraged to purchase when they need fertilisers. This inclusion highlights the environmental benefits of circular fertilisers and supports the market for these sustainable products.

Leveraging GPP channels: circular fertiliser producers should investigate whether their country has preferential marketing channels through GPP. Understanding the local GPP framework can open significant opportunities for producers to supply their products to public administrations, which are increasingly prioritising sustainability in their procurement processes.

Advocacy and policy participation: if circular fertilisers are not yet included in their country's GPP, producers (through their corresponding trade associations) should consider participating in technical discussions with legislators. Engaging in these forums allows producers to advocate for the inclusion of circular fertilisers in GPP policies, highlighting their environmental and economic benefits. Active participation can influence policy development and promote the adoption of sustainable procurement practices.

Exploring other facilitating policies: producers should also explore other national policies or instruments that facilitate the use of circular fertilisers in public works beyond GPP. There may be additional initiatives or programs aimed at promoting sustainable agriculture and waste management, which could provide further opportunities for market expansion.

Public Administration as a key customer: *Public Administrations can be significant customer of circular fertilisers, driven not only by quality and pricing but also by environmental sustainability considerations. Producers should keep in mind that public entities often have mandates to reduce their environmental footprint, making circular fertilisers an attractive option. Building relationships with public sector buyers and understanding their procurement criteria can help producers effectively position their products in this market.*

2.7. Adopt voluntary Quality Assurance Schemes (QAS)

A Quality Assurance Scheme (QAS) is a voluntary system that companies can choose to join to obtain certification demonstrating the quality of their services or products. By participating in a QAS, companies commit to adhering to rigorous standards that ensure their offerings meet specific quality benchmarks. This commitment serves as a reliable indicator to consumers that the products or services they are purchasing are of high quality. Typically, a QAS is organised and managed by a trade association. By promoting these schemes, trade associations help increase consumer trust in the products covered by the QAS.

A QAS can apply to various stages of production to ensure comprehensive quality assurance:

- **Input Material Suitability**. Ensuring that the source materials used in production are suitable and of adequate quality is the first step in a QAS. This measure helps in preventing issues that could arise from inferior inputs.
- **Production Operations Control**. Monitoring and controlling production operations is essential to maintaining consistency and achieving the best final product. Through systematic checks and balances during production, a QAS helps ensuring that the manufacturing process adheres to set standards.
- **Final Product Verification**. Periodic randomised sampling and quality checks of the final product are integral to a QAS. By employing third-party companies for sampling and analysis, the scheme ensures transparency and fairness. These third parties often operate in “blind” conditions, where neither the sampler nor the laboratory knows which company’s product they are examining. This impartial approach helps in maintaining the integrity of the certification process.
- **Usage Compliance**. Though less common, verifying that the final use of the product aligns with good practices and its intended purpose is another critical aspect of a QAS. This ensures that products are not only high-quality but also safe and effective for their designated use.
- **Beyond Product Quality**. Environmental and Social Responsibility. In addition to product quality, a QAS can also address other important factors such as environmental safety and social sustainability. This exhaustive approach ensures that the production processes are not harmful to the environment and that the social rights and well-being of stakeholders and employees are safeguarded.

Voluntary Quality Assurance Schemes are vital for enhancing consumer trust, ensuring product quality at every production stage, and promoting broader ethical standards in business operations. *Through their comprehensive and transparent approaches, QAS help companies demonstrate their commitment to excellence and responsibility, thereby fostering a more trustworthy and sustainable market environment.*

REAL CASE: ***The legislation of some European countries or regions, as Denmark and Flanders, provides that the end-of-waste status for some organic materials depends on the QAS released by national or regional trade associations***. This means that being compliant with the QAS is automatically sufficient to commercialise the final product within their countries.

REAL CASE: **The European Compost Network (ECN) has developed an independent Quality Assurance Scheme (ECN-QAS) covering the basic requirements for a pan-European compost and digestate standard**. The ECN-QAS was established in 2010 and subsequently registered as a trademark for certified quality assurance organisations, compost and digestate products in the European Register of Community Trademarks (OHIM2012/210: TM No 011007168) in order to harmonise requirements across Europe and thereby create an EU-wide market for these circular fertilisers. The ECN-QAS for compost and digestate provides common terms and definitions and a positive list of raw materials and possible additives based on the European Waste Catalogue (EWC), which assigns a code to each type of waste. In terms of compost and digestate characteristics, the ECN-QAS defines declaration rules for fertiliser properties, material properties and biological parameters, while setting specific precautionary environmental criteria for hygiene, impurities and pollutants that apply to both final products.

Currently, four national quality assurance schemes for compost (KBVÖ from Austria, Vlaco from Flanders, BGK from Germany and CIC from Italy) and two for solid digestate (Vlaco from BE, BGK from DE) have undergone ECN-QAS conformity assessment based on the ISO/IEC standard "Conformity assessment for bodies certifying products, processes and services" (ISA/IEC 17065).

Detailed information about quality assurance of compost and digestate-derived fertilisers can be accessed in the 'Guideline to promote quality compost and digestate' of the LIFE BIOBEST project.

3. Recommendations to build trust on the end-users and on the general society

3.1. Ensure transparent communication on product quality

Mistrust among end-users towards circular fertilisers is a significant issue, often rooted in past experiences when there were fewer regulations on materials sold as a compliant circular fertiliser. High-profile scandals, despite involving only a small number of companies, have further heightened concerns. Additionally, since soil is a delicate and balanced substrate, farmers are understandably cautious about using new products on their land.

To address these concerns, it's crucial for circular fertiliser producers to communicate transparently and provide clear, comprehensive information to customers. While product labels display the main characteristics, offering a detailed fact sheet can go a long way in building trust.

This fact sheet should include:

- **Complete list of analyses.** Provide a full list of the tests conducted on the product. This can be specific to the current batch or an average from the past year.
- **Legal thresholds for comparison**. Each value in the datasheet should be accompanied by its legal threshold, similar to how medical reports display recommended values. This helps non-expert buyers understand the safety and compliance of the product.
- **Additional Support and Information**:
  - Include a leaflet or guide highlighting the benefits of using the product. It would be helpful to create several leaflets tailored to different crops common in the area, which could also advertise the product's suitability for those crops (e.g., "The pH of this product is ideal for viticulture").
  - Offer tips on application, such as recommended doses, possible application techniques and the best times of year for treatment.
  - Describe the production process to help buyers understand how waste is transformed into efficient fertiliser.

- **Q&A Section.** Address common questions and concerns to provide further clarity and reassurance.
- **Advertising Other Products.** Promote related products, such as pelletised fertilisers or those suited for organic farming.

REAL CASE: The following Figure presents an example of parts of a flyer which is delivered by an Italian compost producer to their customers together with the product itself. As highlighted, it contains apart from the compulsory information, useful and easily understandable messages for the end-user.

Figure 2. Example of a two-pages flyer provided to the customers by ENOMONDO (compost producer from Italy).

3.2. Strategies to communicate the benefits of circular fertilisers

Effectively communicating the benefits of circular fertilisers to both end-users and the broader civil society is crucial for their widespread adoption. Here are several strategies that can help to achieve this goal:

Open day visits to the production plant can be a valuable opportunity to demonstrate professionalism and the high quality of the process. It is crucial to show that the process is industrial and controlled, with materials tracked from the inlet to the final product, ensuring high quality and safety in all the steps.

On-field demonstration days. Organising demonstration days a few times per year can significantly enhance the visibility and understanding of circular fertilisers. These events should focus on both the production and agronomic aspects. Field demonstration activities are very important and should be included, along with an informal Q&A session.

Informative manuals. Producing and distributing a comprehensive manual is another effective strategy. These manuals can be distributed during demonstration days or other agricultural events, ensuring that farmers have a reliable reference to consult. This manual should:

- Explain what circular fertilisers are and how they are produced.
- Provide detailed instructions on how to use the product for different crops.
- Highlight the benefits of using circular fertilisers over traditional options.
- Publishing the same information of the manual inside a technical journal can be a good option to spread knowledge since they are considered reliable media for farmers and technicians.

Free samples for hobbyist gardeners. Providing small amounts of circular fertilisers to hobbyist gardeners can have a profound impact on public perception. These individuals can witness firsthand the positive effects on their gardens, fostering a broader understanding of nutrient recycling and organic matter's importance. This approach can lead to greater acceptance and advocacy for circular fertilisers within the community, thanks to a bottom-up effect.

Informative website. A website that clearly explains the activities and quality of the products is very important, though it could be too expensive or time-consuming to create and manage, especially for small producers. Therefore, it is possible to refer to the website of an association of producers, if available (see the chapter 3.4 to understand the importance of Associations).

Real-scale study collaborations. Collaborating on real-scale studies of circular fertiliser use can provide compelling evidence of their effectiveness. These studies can showcase tangible results, offering a persuasive argument for their benefits. By partnering with research institutions or agricultural organisations, producers can demonstrate the practical advantages and reliability of their products (see also the previous chapter 0 on collaboration with universities and research centres.)

An example for an on-field demonstration day:

Morning Sessions. *It may start with two presentations: the first, led by an agronomist, should highlight the benefits of circular fertilisers, recommended dosages and the optimal times of the year for application. The second presentation should focus on the production process of the circular fertiliser, detailing the secondary raw materials used and ensuring the audience of its safety and environmental benefits.*

Field Demonstrations. *Following the presentations, a practical demonstration on the application of the fertilisers on the field can be conducted. This hands-on experience allows farmers to see the immediate effects and application techniques.*

Informal Q&A Session. *It is important to have an informal session (such as a coffee break or a refreshment break) where farmers can ask questions directly. This relaxed environment fosters open communication and helps build trust between farmers and fertiliser producers.*

By implementing these strategies, circular fertiliser producers can effectively communicate the benefits of their products, fostering greater acceptance and usage among farmers and the general public.

REAL CASE: The Italian Compost and Biogas Consortium (CIC) organises, in collaboration with the Region of Sardinia and other local stakeholders, on-field demonstration days to promote the use of bio-waste compost among farmers. The structure of the initiative follows the recommendations above and is ***focused on building knowledge on the quality guarantees offered by the local compost industrial value chain, as well as on raising awareness on the benefits for the soil linked to the use of this organic fertiliser.***

Figure 3. Flyer of an on-field demonstration day organised by the Italian Compost and Biogas Consortium (CIC)

3.3. Collaborate with universities and research centres to foster research on your product

In the rapidly evolving landscape of environmental issues, staying at the forefront of research and innovation is crucial. Understanding and sharing information on environmental topics, particularly those related to agricultural practices and soil health, has never been more important. Collaboration with universities and research centres is essential for fostering cutting-edge research on circular fertilisers, ensuring high quality outcomes.

Rapid environmental changes and the need for staying adjourned. Environmental conditions and challenges are changing at an unprecedented rate due to factors such as climate change, pollution and resource depletion. As research and technological innovations continue to advance, our understanding of these issues deepens. This makes it imperative to continuously update and disseminate knowledge based on the latest scientific evidence. Universities and research centres are at the heart of these advancements, making them ideal partners for staying informed and proactive.

Importance of dissemination based on solid scientific evidence. The dissemination of information about environmentally friendly products, like circular fertilisers, must be grounded in robust scientific research since they compete with consolidated conventional products. This ensures that stakeholders, including end-users, policymakers and the general public, have access to reliable data that can guide their decisions. Collaborating with academic institutions ensures that the research at the base of our products is rigorous, peer-reviewed and credible.

Collaboration in regional, national and European projects. Being engaged in regional, national and European funded research projects offers significant advantages. These collaborative efforts bring together producers, experts and researchers from various fields, facilitating the exchange of ideas and knowledge. Participating in such projects enables us to meet other industry leaders and experts, fostering a community of practice that can drive innovation and improvements in circular fertiliser technologies. Sharing information and best practices within this network is invaluable for advancing our understanding and application of sustainable agricultural solutions.

Carry out a Life Cycle Assessment (LCA) and disseminate the results. LCA is a crucial methodology for evaluating the environmental impacts of a product, process, or service throughout its entire life cycle. A circular fertiliser producer can collaborate with universities or research centres to conduct an LCA of their plant. Disseminating these results demonstrates the environmental benefits of recycling nutrients and organic matter to the general society and, moreover, to the local community. Alternatively, private companies and environmental consultants can perform LCAs, but partnering with research projects can be more cost-effective and beneficial for society.

Collaborating with universities and research centres is not just beneficial but essential to foster research on circular fertilisers. *As environmental issues evolve rapidly, staying informed and basing our dissemination efforts on solid scientific evidence is crucial. Research partnerships provide the necessary validation of the positive effects of circular fertilisers on soil health, helping to build trust and encourage adoption.* ***By participating in collaborative projects at various levels, we can leverage collective expertise, drive innovation and contribute to the sustainable future of agriculture.***

3.4. Join trade associations

Associations of circular fertiliser producers exist both at the EU and national levels, providing significant benefits to their members. Such as the European Compost Network and the European Biogas Association at the EU level and national associations.

Understanding product value. Membership in such associations allows producers to gain a clearer understanding of the market value of their products. By comparing prices and practices with other members, producers can better position their products in the market and ensure they are fairly valued.

Navigating complex and under-development legislation. The legislation governing circular fertilisers is dynamic and rapidly evolving, reflecting the relative youth of the market. Being part of an association helps producers stay informed about legislative changes and adapt accordingly. Moreover, associations engage in lobbying activities at both national and EU levels, advocating for the interests of their members and helping to shape favourable regulatory environments.

Dissemination of information. Associations provide valuable resources such as fact sheets and promotional materials that help producers communicate effectively with end-users and their corresponding associations. These resources educate potential customers about the benefits of circular fertilisers, enhancing market acceptance and demand.

It is essential that national/local associations count with an accessible and informative website since they are the reference point for many end-users. The website should be easy to navigate and understand, aiming to a wide range of users including farmers, citizens, students and public administrators as well as include scientific data and case studies to substantiate the benefits of circular fertilisers. Finally, it should offer practical advice on application techniques, crop-specific guidelines and environmental benefits.

Addressing environmental issues. Environmental challenges and opportunities are continuously emerging as research and innovation advance. Associations facilitate the sharing of critical information on these topics, enabling members to stay ahead of industry trends. Moreover,

presenting a united stance on controversial issues can significantly impact public perception and policy decisions. Associations also have the capacity to fund research initiatives, driving further advancements in the field.

Joining or building an association of circular fertiliser producers offers numerous advantages, from understanding product value and navigating legislative changes to disseminating information and addressing environmental issues. ***By associating together, producers can strengthen their market position, influence policy and contribute to the sustainable development of the industry.***

4. How to gain local acceptance for the settlement of a fertiliser production facility in the territory

4.1. Fight against the NIMBY attitude

NIMBY, an acronym for "Not In My BackYard", refers to the opposition by local residents to the development of certain projects in their vicinity, despite recognising the broader benefits of such initiatives. This phenomenon is prevalent in the fields of environmental services and renewable energy production, where the proposed developments, though recognised as environmentally beneficial, are often met with resistance from nearby communities.

Gaining local acceptance for the placement of the production facility in a territory requires strategic engagement with the local community and stakeholders. Here are several approaches that can help achieve this goal:

Organise plant visits. The producer can organise visits to a similar facility for end-users and general civil society. These tours can showcase the high-quality standards maintained during the recycling and production phases of the fertiliser. Demonstrating the industrially controlled process and the safety measures in place can educate the community on the importance of recycling and the safety of the produced fertilisers. This transparency helps to build trust and dissipate concerns about environmental impact or product safety.

Enhance community spaces. It is possible to create a public green space adjacent to the facility. Developing such spaces for public use adds value to the community and brings citizens closer to the facility in a positive context. These green areas can serve as a symbol of the producer's commitment to environmental stewardship and community well-being.

Activate social gardening activities. Engaging the community in social activities related to gardening and horticulture can also foster acceptance. Social gardens, where people can grow their vegetables as a hobby and a source of fresh food, can be particularly beneficial. These gardens offer an opportunity for the community to try the circular fertiliser firsthand, seeing its quality and effectiveness. Such initiatives can also promote social cohesion and well-being.

Participate in agricultural and local trade fairs. Local agricultural trade fairs are common across the EU. Fertiliser producers or their associations can participate in these events with informational stands. At these stands, they can distribute flyers, provide product information and

offer small bags of fertiliser for attendees to try. This exposure at public events can increase awareness and acceptance of the product.

Engage with educational institutions. Since some circular fertiliser producers are wholly or partially public institutions, they can organise educational activities with schools. These activities can educate students on the importance of the circular economy, proper waste separation and healthy soil management. Early education can foster long-term community support and environmentally conscious behaviour.

Involve local stakeholders. Producers can enhance acceptance by participating in or organising common boards with local stakeholders, such as municipal representatives, citizens' committees and local environmental and agricultural associations. These boards can facilitate open dialogue, address concerns and collaboratively develop solutions that benefit the community and the environment.

Obtain green and quality certifications. Finally, obtaining green and quality certifications can be highly beneficial. Certifications like the EMAS (Eco-Management and Audit Scheme) demonstrate the producer's commitment to environmental excellence and high-quality production standards. Such certifications provide a credible and visible assurance to the community of the facility's green practices and product safety.

By implementing these strategies, the producer can build strong relationships with the local community, enhance transparency and demonstrate their commitment to environmental and social responsibility.

5. Summary and conclusions

FER-PLAY project underscores the importance of adopting circular fertilisers to promote sustainability, reduce reliance on imported resources while supporting a circular economy in Europe. Through a collaborative approach involving key stakeholders such as producers, end-users, and public authorities, the project has successfully identified both the opportunities and challenges associated with circular fertiliser production and use.

This document gathers a series of recommendations addressed to circular fertiliser producers that fall within three main topics:

- Improvement of commercial strategies for the uptake of circular fertilisers in the market
- Building trust on the end-users and on the general society
- Foster Local acceptance for the settlement of a fertiliser production facility in the territory

The main key messages displayed in the previous pages can be summarised in the following points:

- Give a proper market value to their products (taking into account nutrient content and benefits to soil health), to contribute to the financial health of circular fertiliser producers, enhance the reputation of the sector and foster sustainable agricultural practices. This strategic shift will not only benefit producers but also ensure that farmers receive high-quality fertilisers that improve soil health and crop yields.
- Integrate technical support from an agronomist and machinery for fertiliser application into their commercial offer, to build trust with farmers, supporting them through the transition and ensuring the long-term health and productivity of their crops and soil. This all-round approach not only addresses farmers' concerns but also promotes local sustainable agricultural practices, benefiting the entire ecosystem.
- Establish yearly sales contracts with farmers, can be a strategy to better manage the production cycles, reduce inventory challenges and meet the agronomic needs of farms effectively.
- While arable land remains a crucial market for circular fertilisers, exploring alternative destinations can diversify revenue streams and enhance profitability. Targeting hobby gardening, the private leisure sector, horticulture, perennial crop sectors, growing media production and refining products for higher quality can open new opportunities for producers.

These alternative markets not only provide economic benefits but also support sustainable agricultural practices across a broader spectrum of applications. By considering and investing in these varied market destinations, producers can ensure a robust and versatile approach to circular fertiliser distribution.

- The organic farming represents a lucrative market opportunity since they cannot use conventional synthetic fertilisers. The consistent increase in organic farming surfaces, combined with robust products market values makes the organic farming sector one of the most interesting for circular fertiliser producers.

- Circular fertiliser producers should actively engage with the GPP framework and other related policies to capitalise on opportunities within public procurement. By advocating for the inclusion of circular fertilisers in GPP and exploring other supportive policies, producers can expand their market reach and contribute to the broader goals of environmental sustainability and resource efficiency in public administration.

- Voluntary Quality Assurance Schemes (QASs) are essential instruments for enhancing consumer trust, ensuring product quality at every production stage, and promoting broader ethical standards in business operations. Through their comprehensive and transparent approaches, QASs help companies demonstrate their commitment to excellence and responsibility, thereby fostering a more trustworthy and sustainable market environment.

- Provide thorough and easily understandable information can help alleviate farmers' concerns, demonstrate the value of their products and foster a more trusting relationship. Clear communication is key to support farmers in making informed decisions and ensuring the successful adoption of circular fertilisers.

- Implement education, practical demonstrations and transparent communication strategies, circular to effectively communicate the benefits of their products, fostering greater acceptance and usage among end users and the general public.

- Joining or building an association of circular fertiliser producers offers numerous advantages, from understanding product value and navigating legislative changes. By associating together, producers can strengthen their market position, influence policy and contribute to the sustainable development of the industry.

- Research partnerships with universities or technological centres can provide the necessary validation of the positive effects of circular fertilisers on soil health, helping to build trust and encourage adoption. By participating in collaborative projects at various levels, we can leverage collective expertise, drive innovation and contribute to the sustainable future of agriculture.

- Implement strategies to gain local acceptance and avoid the NIMBY (Not In My Backyard) attitude is of outmost importance. The producer can build strong relationships with the local community by organising plant visits, creating green community spaces, engaging educational institutions into activities, etc. These initiatives will enhance transparency and demonstrate their commitment to environmental and social responsibility.

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