Novafert

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D3.5 – Initial policy brief

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Table of Contents

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Abbreviations

CAP: Common Agricultural Policy

CMC: Component Material Categories

FPR: Fertilizing Products Regulation

INMAP: Integrated Nutrient Management Action Plan

RENURE: Recovered Nitrogen from Manure

JRC: Joint Research Centre

EBA: European Biogas Association

CEAP: Circular Economy Action Plan

NVZ: Nitrate Vulnerable zones

ABP : Animal by-Product

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Executive Summary

Deliverable 3.5 (D3.5) aims to create policy recommendations to address the identified challenges/barriers and promote the adoption of biobased fertilizing products. The policy briefs included in this deliverable consist of one jointly formulated document and one tailored specifically to the objectives of the NOVAFERT project.

NOVAFERT drafted a joint open letter to facilitate the safe use of RENURE products from NOVAFERT, COPA-COGECA, EBA, and three other EU projects to the European Commission responsible for the Integrated Nutrient Management Action Plan (INMAP). The reasoning behind sending a joined letter is that a common document has more weight than a recommendation made by a single project or sectoral group. The NOVAFERT policy group is led by UGent. Cosignatories of the open letter include COPA-COGECA, representing about 23 million farmers and 22,000 agricultural cooperatives; the European Biogas Association, representing nearly 8,000 stakeholders in the biogas and biomethane value chain throughout Europe; and three other European consortia focusing on nutrient recycling and alternative fertilizers – Nutri2Cycle, FERTIMANURE, and NUTRI-KNOW.

A policy brief tailored to meet the specific requirements of NOVAFERT has been drafted in direct response to the European Commission's public consultation on the Evaluation of the Nitrates Directive. This comprehensive brief integrates insights obtained from six participating member states within the NOVAFER project, offering light on the current situation of nutrient recycling and the challenges hindering progress in compliance with the Nitrates Directive Additionally, it is accompanied by a joint letter endorsed by six other EU projects, further amplifying the collective voice and expertise on this critical issue.

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1. Introduction

Several European projects (mainly in Horizon 2020 and Horizon Europe programmes) are currently evaluating the efficiency and environmental safety of potential CE-marked alternative fertilizer products across various growing conditions, including their impacts on soils, water, and air, in line with the "Farm to Fork" and "Biodiversity" European strategies published in May 2020. NOVAFERT aims to bring together the required information for the effective and safe use of fertilizing products in order to facilitate decision-making on valorisation employed for nutrient recovery, based on actual demands at the regional and market levels throughout the EU.

The policy framework is considered to be one of the driving forces behind the sustainable adoption of alternative fertilisers. The amendment of the Fertilising Products Regulation has paved the way for the development of those products on the market. Nonetheless, the practical implementation into local/national settings and the actual adoption and implementation in the field remain open for further multi-actor discussion.

Within the SAFEMANURE/ReNure research project the JRC-EC evaluated various manure-derived products. Following a set of conditions, some manure-derived products were proven to be a safe alternative for chemically produced nitrogen fertilisers without increasing the risk of nitrate leaching. The actual implementation of all these efforts is hampered by some outstanding issues that must be resolved, and RENURE products face a major obstacle in the 32-year-old Nitrates directive (limited to 170 kg N ha^{-1} y^{-1} in Nitrate Vulnerable Zones) and the market for these sustainable fertilizers struggles to develop due to a lack of legal certainty. This progress towards practical policy implementation is a significant supporting role that NOVAFERT plays through mediated policy interaction and providing science-based technical assistance for suggested implementation through specialized policy briefs. As the technologies are established, installations ready to produce, farmers seek nitrogen fertilizers, and the EU needs to reduce the energy required for fertiliser production, the RENURE criterion implementation should not be delayed any longer.

NOVAFERT, therefore, urges the European Commission to consider making the necessary legislative proposals so that RENURE fertilizers can be used outside of the limited amounts for animal manure in vulnerable zones, considering the lower potential environmental effect. In order to successfully implement these regulatory changes, it is important to consider all related legal regulations and, if necessary, modify them in an appropriate manner, to ensure a complete registration system for the use of any fertilizer types, both at the individual farm level, as well as in the Member states.

The European Commission is now developing an Integrated Nutrient Management Action Plan (INMAP) to tackle the currently unsustainable nutrient flows in the EU (mainly nitrogen (N) and phosphorus (P). The INMAP will complement the Zero Pollution Action Plan by aiming to meet the European Green Deal objective of reducing nutrient losses by at least 50% and fertiliser consumption by at least 20% by 2030. The joint policy note reported in this deliverable, have been drafted addressing several identified bottlenecks in regulatory frameworks, including the

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Nitrate Directive and the INMAPs. NOVAFERT, along with other EU projects and the EBA, urges the EC to make necessary legislative proposals to allow and facilitate the safe use of RENURE products and to use the INMAP to provide guidelines for their use in addition to the compositional criteria proposed by the European Commission previously.

Further, on December 1st, the European Commission initiated a public consultation on the evaluation of the Nitrates Directive. Stakeholders including farmers, industries, NGOs, public administrations, water authorities, and others were encouraged to contribute their perspectives until March 8th, 2024. Within the framework of the NOVAFERT project, discussions were held with partners and stakeholders from Finland, Belgium, Ireland, Spain, and Poland. The prevailing sentiment expressed during these discussions is that the current structure of the Nitrates Directive hampers the effective implementation of nutrient recovery from manure-based products, primarily due to the constraints outlined in Article 2(G) and the absence of clear guidance on the implementation of RENURE. Consequently, the policy letter included in this deliverable presents an overview illustrating how the current Nitrates Directive fails to incentivize the processing and upcycling of nutrients from manure into more efficient uses, leading to environmental losses within the NOVAFERT participatory regions. Furthermore, it underscores how this lack of support, rather than aiding, obstructs the technical implementation of the Fertilising Product Regulation. In addition to the public consultation, the European Commission demanded several EU projects across different frameworks (H2020, Horizon Europe, INTERREG) to provide both Europe and the Commission with scientific-technical evidence and policy-oriented advice, on topics related to circular economy in general and nutrient (re)cycling in particular. In response to this request, NOVAFERT together with 6 other European research projects (ReNu2Cycle, LEX4BIO, NutriBudget, FERTIMNURE, NUTRI.KNOW, and Nutri2Cycle) provided a feedback letter, based on the insights from the various project activities. In this paper, the involved research projects make very clear statements on the implementation of the ReNure criterion and the adaptation of the legal status of ammonium salts from off-gases as validated solutions that can and need to be implemented, amending the current Nitrate Directive.

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2. Joint position paper on the safe use of RENURE products in the INMAP

Unlocking the safe use of RENURE products in the INMAP: an opportunity for nutrients recycling and on-farm circularity

The cosignatories include COPA-COGECA, which represents over 23 million farmers and 22,000 agricultural cooperatives, the European Biogas Association, which represents nearly 8000 stakeholders from the biogas and biomethane value chain in Europe, as well as four European projects focusing on nutrients recycling and alternative fertilisers – Nutri2Cycle, NOVAFERT, FERTIMANURE and NUTRI-KNOW.

The need to reduce dependency on nitrogen fertilisers by diversifying the sources of fertilisers and developing the supply of sustainable fertilisers has gained urgency following Russia's war on Ukraine. Using fossil-free, low-carbon, recycled nutrients to produce organic fertilisers will also accelerate the decarbonization pathway to a net-zero Europe. These challenges were outlined in the communication of the Commission on Safeguarding food security and reinforcing the resilience of food systems from November 2022 as well as in the resolution of the European Parliament on the availability of fertilisers in the EU from February 2023. Yet, to date, RENURE ('Recovered Nitrogen from manure'; term and criteria as initially proposed by the European Commission) products face a major barrier in the 32 years old Nitrates directive and the market of these sustainable fertilisers struggles to develop due to a lack of legal certainty. Nonetheless, RENURE products have the potential to significantly replace synthetic/inorganic nitrogen fertilisers as produced based on natural gas, thereby improving both the environmental impact as well as economic and geopolitical self-reliance.

In the framework of the upcoming publication of the Integrated Nutrient Management Action Plan (INMAP), we call on the Commission to allow and facilitate the safe use of RENURE products and employ the INMAP to provide guidelines for their usage in addition to the compositional criteria as previously proposed by the European Commission (yet never implemented upon their initial proposal).

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Organic fertilisers partially or entirely derived from animal manure through processing, known as RENURE, represent a key tool to substitute synthetic/inorganic fertilisers, increase on-farm circularity and make food systems resilient as they depend on locally available resources while preserving the environment and waters in Europe. In line with the objectives of the EU Green deal, RENURE products contribute to recycling nutrients, increasing resource efficiency and when adequately managed, avoid nutrients losses and maintain soil fertility.

In the framework of the INMAP, we urge the Commission to:

- allow for a temporary exemption from the Nitrates Directive limit, in the short term, so that the safe use of RENURE products is allowed above the limit of 170 kg of nitrogen per hectare per year, based on the RENURE criteria developed by the Joint Research Centre.
- propose a revision of Annex III of the Nitrates Directives to allow for a permanent exemption of RENURE products from the Nitrates Directive limit in the medium term. The Expert group on the implementation of the nitrates Directive or a dedicated expert group should propose a set of guiding agronomic practices to mitigate any potential environmental risks.

Today, there are still a lot of misunderstandings regarding the application of RENURE products. Emphasizing the fact that 90% of organic manure can be applied immediately, or that there can be a risk of additional ammonia emissions is true but irrelevant. Multiple streams with different contents of nitrogen, phosphorus and other minerals such as potassium are created from the processing of classic animal manure. To this end, a more targeted fertilization, tailored to crop and plant needs, is possible in a similar way to precision application of synthetic/inorganic fertilisers. Moreover, the treatment process allows a better recovery of ammonia in manure so that extra nitrogen fertiliser is ultimately available for the crops from the manure.

RENURE is made by extracting the emitted ammonia and converting it into organic precision products. This process can happen in the barn or in a digester. Therefore, a reduction in ammonia emissions is already taking place. The manure is then further processed and remains integrally available to ensure fertilisation in the organic manure proportion. Thus, the conclusion is unmistakable:

- The basic fertilisation remains virtually the same although after treatment it concerns modified products which can be targeted more efficiently.
- The RENURE product obtained reduces ammonia emissions in the process, thus generating additional nutrients and having the same characteristics as fertilisers (able to replace synthetic/inorganic fertilisers and thus usable for precision farming).
- When applying RENURE products, there is a risk of increased emissions compared to

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synthetic/inorganic fertilisers application (as underlined in the Safemanure report by the Joint Research Centre). Nevertheless, there are available and currently applied techniques to avoid emissions and one cannot ignore the avoidance of emissions earlier in the process when producing such fertilisers.

- Facilitating the use of RENURE products is therefore not about applying extra manure, but about replacing synthetic/ inorganic fertilisers in a sustainable, circular way, while at the same time avoiding ammonia emissions and also generating energy.

Link to the document: Open-Letter_RENURE-in-INMAP.pdf (novafert.eu)

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3. Policy Brief - EC Consultation on the Nitrates Directive (Q1-2024)

3.1 Introduction NOVAFERT

The new Fertilising Product Regulation (FPR) increases the number of CE-marked alternative fertilising products on the EU's market, including organic, organo-mineral and mineral bio-based fertilisers by reducing dependency on imported mineral fertilisers. However, the acceptance of these novel alternative fertilising products requires knowledge sharing among farmers and citizens about their fertilising efficiency and safety.

NOVAFERT aims to orientate the production and the application of alternative fertilising products according to the best environmental performances, by establishing methodological guidelines for the assessment of alternative fertilising products' production, storage, distribution and application.

A regional approach, covering 7 EU regions and different types of secondary raw materials, will also support the development of sustainable local value chains deploying alternative fertilising products. These strategies will be helpful to enhance the uptake of alternative fertilising products and contribute in the long term to recommending directional guidelines for the Common Agricultural Policy (CAP).

Furthermore, the use of alternative fertilising products should contribute to improve the nutrient flows, especially from nutrient-rich side-streams, reducing the nutrient losses into the environment.

3.2. Input from the participating regions / countries

3.2.1 Poland

Contribution provided by MEERI Institute, Poland

https://min-pan.krakow.pl/en/

In Poland, we recognize the significance of the Nitrates Directive in addressing environmental concerns and promoting sustainable agricultural practices. With a focus on innovation and collaboration, our perspective emphasizes the need for tailored solutions that balance agricultural productivity with environmental stewardship. We believe in leveraging the NOVAFERT project to enhance our region's capabilities in nutrient management and soil health. Specifically, we aim to integrate advanced technologies and practices into our agricultural systems to optimize nutrient use efficiency, reduce nitrogen losses, and mitigate environmental impacts. Moreover, we see opportunities to foster knowledge exchange and capacity building among stakeholders to ensure the effective implementation of the Directive's provisions.

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Beyond regulatory compliance, our region sees the Nitrates Directive as an opportunity to drive positive change in Polish agricultural practices. We aim to leverage this framework to promote the adoption of best management practices, such as precision agriculture or nutrient recycling, that enhance soil health, reduce nutrient runoff, and support biodiversity conservation. Furthermore, we recognize the importance of stakeholder engagement and capacity building in facilitating the effective implementation of the Directive's provisions.

Beyond regulatory compliance, we see the Nitrates Directive as an opportunity to drive innovation and collaboration within the fertiliser sector. By fostering partnerships between industry stakeholders, research institutions, and government agencies, we aim to develop and promote environmentally friendly fertilisation solutions tailored to the unique needs of Polish agriculture.

3.2.2 Ireland

Contribution provided by TEAGASC, Ireland

https://www.teagasc.ie/

The Nitrates Directive, implemented by means of the Nitrates Action Programme (NAP), is the key agricultural measure in Ireland's River Basin Management Plan for preventing and reducing water pollution from nutrients (nitrogen and phosphorus) arising from agricultural sources. The purpose of the national regulations implementing the directive is to provide a set of measures to ensure the protection of waters, including drinking water sources, against pollution caused by nitrogen and phosphorus from agricultural sources, with the primary emphasis on the management of livestock manures and other fertilisers.

Ireland's Nitrates Action Programme is given effect by the European Communities (Good Agricultural Practice for Protection of Waters) Regulations 2022 (S.I. No. 113 of 2022). The regulations contain specific measures to protect surface waters and groundwater from nutrient pollution arising from agricultural sources. The Fifth Nitrates Action Programme was developed following an initial public consultation, which was held in late 2020, and a second consultation period that concluded in September 2021. A third consultation period focused on the draft Natura Impact Statement and draft Strategic Environmental Assessment for the Programme was concluded on January 2022. Approximately 700 submissions were received during the three consultation periods and these have informed the final Programme.

Future developments of the Nitrates Directive could consider making provision for credit to be given for the recovery and recycling of organic nitrogen from manure based sources into mineral fertiliser equivalent products. These new mineral fertiliser N equivalent products could be used to displace mineral fertiliser reliance in Europe. Such a development could boost and encourage biorefining developments relating to manure in the local rural economies giving an added impetus to the development of the local rural bioeconomy.

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3.2.3. Croatia

Contribution provided by IPS Konzalting, Croatia

https://ips-konzalting.hr/en_US/

Since joining the European Union on July 1, 2013, Croatia has been required to adhere to the Nitrates Directive, operating under the I. Action Program for safeguarding water against nitrate pollution from agriculture. This program's obligations are specific to nitrate-vulnerable zones, covering 9 % of Croatia's territory and comprising 75 cities and municipalities. Farmers must follow guidelines on fertiliser usage based on climate and soil conditions, prohibiting manure from spreading during unsuitable periods, as stipulated by the I. Action Program, particularly in snow-covered areas, flood-prone zones, areas near watercourses, and I and II sanitary protection zones. Initially, farmers encountered challenges, including constructing manure storage facilities and facing restrictions on manure or nitrogen fertilisation.

While Croatia complies with the Nitrate Directive, there has been a concerning trend over the past decade. Livestock production has declined, and imports have increased. Comparing 2023's meat production to the pre-EU accession year (2013), both pork and beef production have dropped by approximately 10 %. Eurostat data indicates that, aside from natural indicators, Croatia's livestock farming lags in value compared to the EU average. This is evident in the lower number of livestock units per hectare in Croatia compared to the EU average, resulting in nutritional deficits in Croatian fields.

Reversely, Croatia had – since before the ascension into the European Union – a strong tradition of state-subsidized synthetic fertilizer use in order to compensate nutrient deficiencies and maintain agricultural productivity. Nutrient recycling can provide a provide suitable alternatives to these mineral fertilizers, and by cross-connecting to animal production for the recycling / upcycling also maintain a stable and more sustainable animal production.

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3.2.4 Flanders (Belgium)

Contribution provided by Ghent University, Belgium

www.ugent.be

Flanders, Belgium is fully classified as Nitrate Vulnerable Zone (NVZ) and thereby is closely monitored and scrutinized in terms of environmental impact resulting from agriculture towards the quality of water bodies (both ground water and surface water). Limiting the fertilization limit to 170 kg N/ha from animal manure, initially improved the impact from agricultural practices on the environment by curtailing over-fertilization. Nonetheless, as per crop balance many (if not most) crops have accepted crop requirements well above this limit, it also

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stimulated a strong increase of the use of synthetic fertilizers derived from natural gas. For a very long time – up to the 6th Manure Action Plan (MAP-6) in our region, the improvement of water quality was focusing heavily on further restrictions related to animal manure use, assuming the nitrogen from mineral sources to 100% effective towards plant uptake and thereby not significantly contributing to nitrogen losses.

This has resulted in a situation at time of writing where stimulated use of synthetic fertilizers has grown into 45% of all N being applied on the field in our region, or roughly equivalent to the amounts coming from animal production. This a paradox since the original Nitrates Directive sought to reduce overall environmental impact from agriculture. Moreover, environmental models (e.g. the MARINA model and the NUTRIFLOW mass-flow-analysis report (Flanders)) have demonstrated that large parts of nitrogen in our surface waters (and eventually the North-Sea) coming from both Flanders and the Netherlands are to a large extent associated with nitrogen from synthetic fertilizers. Thus in order to achieve good environmental quality, the full crop balance (and losses) needs to be taken into account and not the sole scrutiny on the animal manure part of the equation as the Nitrates Directive in current form appears to emphasize on.

Moreover, since the implementation of the Nitrates Directive, now more than 30 years ago, the state-of-technology has evolved significantly in terms of manure management and manure processing. Amongst others, technologies have been developed that allow recovery and upcycling of manure products into products containing high ratios of mineral over total nitrogen and thereby equivalent in Nutrient Use Efficiency (NUE) and plant availability to the synthetic mineral fertilizers. These products – which by the European Commission (in frame of the SAFEMANURE evaluation) have been called RENURE products, standing for Recovered Nitrogen from Manure. Investigations at relevant scale have demonstrated such products are equivalent in both agronomic performance (in terms of yield and crop quality) and environmental performance (in terms of N losses) when compared to synthetic fertilizers such as CAN or ureum. Ample scientific reports and articles are available on that and many of those have already been submitted to the EC DG ENVI in frame of the SAFEMANURE evaluation. We therefore also strongly recommend to consider that wealth of substantiating evidence in frame of the current Nitrates Directive evaluation.

However, one particular article under the Nitrates Directive – namely Art. 2(g) – stipulates that "animal manure remains animal manure, even in processed form". Our understanding is that originally this article was included to avoid businesses and member states to evade the legal requirements associated to animal manure by adopting minimal processing and thereby actively pursuing an end-of-manure status and all the requirements associated with it. As abovementioned, the state-of-technology has evolved to the point that this article has now become a roadblock towards innovation and sustainable development, in the sense that it forbids in current wording the implementation of RENURE to substitute synthetic fertilizers in the crop-requirements and fertilization schemes above the 170 kg/ha.N in NVZ. This implies in practice that the topping up above this 170 kg/ha.N still remains under the monopoly of

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synthetic fertilizers in spite of technology allowing substitution of fossil-based (from natural gas) by biobased (from manure) fertilizing products.

Moreover, even if the Art. 2 (g) would remain unchanged in the future, there is mis-alignment within the European Commission DGs related to the definition of processed manure itself – being defined differently in different EU legislations. Also – on the interpretation of these pieces of legislation there appears to be a mis-alignment. For example official declarations related to the Animal Byproducts regulations as issued by EC officials state that ammonia in gaseous form coming from composting, drying, cleaning of stable air or stripping, does not constitute as an animal byproduct and therefore is also not animal manure. Nonetheless the same EC under the Nitrates Directive still considers ammonium salts retrieved by scrubbing from such ammonia gaseous exhausts to be animal manure under the interpretation of abovementioned Art. 2(g). This again does not help the credibility of the EC on these sensitive issues, nor does it stimulate technological development and transition towards a more sustainable agriculture.

Another negative side-effect on the (interpretation) of Art. 2(g) in its current form has been the interpretation of 'mixing' as a process when dealing with co-digestion of waste streams with manure. In our region, this has led to the interpretation that ALL nutrients in the final digestate (so also coming from food-industry related byproducts or plant-based materials) are considered animal manure, regardless of the fraction of animal manure in the overall feedstock. This has resulted in anaerobic digestion plants becoming 'multipliers of animal manure' even in the absence of animals. A scan of the different interpretation of Art. 2(g) between member states, has resulted in an unequal legal consideration of the legal status of digestate vis-à-vis the Nitrates Directive. In this we noticed that Flanders is unique in its most stringent interpretation of mixing – where ALL other (non-manure) nutrients also become animal manure. Nonetheless there is a patchwork of legal interpretations across the EU that could benefit from some harmonization on such matters as the Nitrates Directive interpretation and implementation.

A final negative side-effet of Art. 2(g) has been that technological innovations which in Germany, the Netherlands and Flanders on manure processing into materials for insulation, fiber boards or even products such as flowering pots based on biobased materials derived from the solid fraction of animal manure, still are considered animal manure by law. This has thereby implications on the requirements of board documents when transporting these products (GPS-tracked manure transports) and the legal status and obligations of the receiver which then needs to become a manure processor and/or manure end-taker. So in the case where garden landscapers or garden retail businesses would like to accept such flowering pots from manure-based biobased polymers, they need to register themselves as manure end-processor or -user. This again has delayed and stopped technological developments in the biobased economy.

In conclusion, in regions with a rich tradition in agriculture and equally rich in manure, many sustainable uses have been proposed ranging from energy production (via biogas), over mineral fertilizer production (potentially replacing synthetic fertilizers), or even materials derived and refined from manure. The current Nitrates Directive is ill-equipped to deal with

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these innovative sustainable end-uses and has even been experienced as a bottleneck for sustainable development considering that the state-of-technology has evolved beyond the state-of-legislation.

3.2.5. Catalunya (Spain)

Contribution provided by University of Vic, Spain

https://betatechcenter.com/

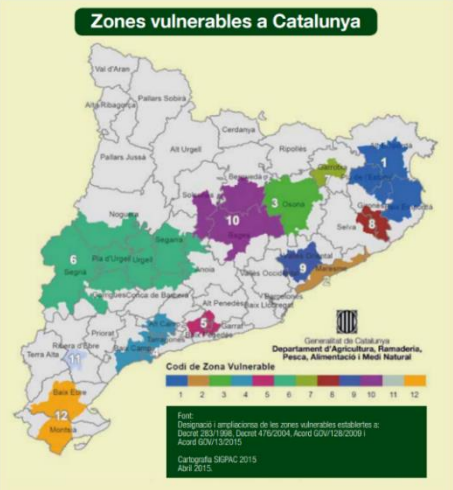

Figure 1 Distribution of the areas designated as vulnerable to nitrate pollution of agricultural origin

Catalonia (Spain) is characterized by its intense agricultural activities and not efficient management of livestock manure, which have caused a chronic excess of nitrates affecting water bodies (eutrophication) and, especially, the groundwater. Therefore, excessive nitrogen levels have garnered significant attention from regulatory bodies. The Nitrates Directive mandates member states to develop a Code of Good Agricultural Practices, which is obligatory in designated vulnerable areas and recommended elsewhere. In Catalonia, Following Directive 91/676 EEC, Decree 283/1998 was established through an Order on October 22nd, 1998, designating what are called vulnerable zones (VZ) for nitrates (Figure 1). Additionally, the Directive requires the implementation of action programs for vulnerable areas. To comply, the Generalitat adopted Decree 136/2009 on September 1st, which approves the action program addressing nitrate pollution from agricultural and livestock manure management sources. Concurrently, various promotion, training, control, and inspection programs were initiated in alignment with the Nitrates Directive. Vulnerable areas in Catalonia are grouped based on agronomic, soil, and climatic characteristics, with a map defining 12 such areas. Farms located in these vulnerable zones must adhere to the measures outlined in Decree 136/2009 to qualify for specific aid from the CAP and Rural Development Program.

In these areas, fertilization with organic fertilizers (including digestate) is more limited and can be supplemented with inorganic fertilizers. In addition, the Law 7/2022 on waste and contaminated soils for a circular economy must be considered, as well as two Catalan Decrees; Decree 152/2017, on the classification, coding, and management routes of waste in Catalonia, and Decree 93/1999, on waste management procedures. From these regulations, it is inferred that, for field application, the operation route of digestate management used is coded as R10-"Recycled for field application," where the digestate is considered waste. Previously, it is required that the source materials have undergone an intermediate treatment, an operation of recycling coded as R.12.16-"Anaerobic stabilization of organic waste." Finally, in the case that it includes sewage sludge (both from municipal and industrial sewage treatment plants), the Royal Decree 1310/1990 must also be considered, and the analytics of Order AAA/1072/2013 must be included. On the other hand, in the case that it includes SANDACH material (SANDACH

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= Animal Byproducts Not Destined for Human Consumption), excluding livestock manure, Regulation (EU) 1069/2009 must also be considered, which indicates the treatment to be applied to the digestate in order to be applied to the field.

In addition, the application of manure and manure-derived digestates to the soil is only possible in certain periods. For this reason, if the final destination is direct application, it is necessary to have certain storage capacities. This stage (storage) is considered a critical stage, especially for the digested materials, because it has a great potential for emissions of both greenhouse gases (e.g. methane) and other pollutants such as ammonia which means, in the time, a reduction of nitrogen that could be valued as fertilizer. For this reason, as established in the European roof directive, the application of BAT (Best available Technologies) is necessary in order to substantially reduce and limit these emissions. These BAT include, among others, measures such as acidification and covering of storage ponds. The management of this digestate generates, or can generate, business opportunities for engineering and service companies for the construction of storage systems, covering them, treatment and field application technology companies, as well as logistics, transport and field digestate application companies.

As explained, the direct field application of digestate is a practice that generates agronomic benefits and has relatively low operating costs. However, Catalonia presents a mismatch between the production areas of organic resources to feed the anaerobic digesters and the land available for their direct application. The main option for the valorization, or part thereof, would be to treat the manure and manure-derived digestates to obtain commercially viable agronomic products as registered fertilizing products. This route would make it possible to transport nutrients out of areas with high organic waste production to areas in need of fertilizer imports. NOVAFERT is working in Catalunya to identify where these products are currently being produced and in which extent, they are commercialized. The products obtained from digestate treatment (concentrates, solid fractions, among others) could be applied directly to field on those areas where is needed, but they are still subjected to the same regulation. Beyond the fertilizer laws themselves, the Law 7/2022 on Waste (which incorporates Directive (EU) 2008/98/EC on waste) and Regulation (EC) 1069/2009 on SANDACH materials must also be considered when including these materials in fertilizer formulations.

In summary, it indicates that organic waste must undergo a valorisation process, including recycling, before it can be considered as a fertilizer ingredient, but still they are subjected to several regulations. Once they have achieved the end-of-waste condition (EWC) or the final point in the manufacturing chain (FPMC), they can adhere to Regulation (EU) 2019/1009 on fertilizers, ceasing to be governed by their original regulations.

Recently, Catalonia has developed several strategies to monitor, prevent and reduce diffuse pollution. Working directly with farmers, institutes like BETA are testing innovative soil and nutrient management practices. All the solutions aim to improve nutrient use efficiency consequently reducing the need of traditional mineral fertilizers and decreasing nutrient losses from rural areas communities on top of the limitations for nitrogen application in NVZ. Also,

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Catalonia aims to co-design novel governance approaches that promote the implementation of these practices.

3.2.6. Andalusia (Spain)

Contribution provided by BioAzul, Spain

https://www.bioazul.com/en/

The development scope of nutrient recycling is less developed in Andalusia, than in other regions within NOVAFERT, such as Flanders (BE), Ireland or Catalunya (ES). Therefore the 17implementation and challenges related to the Nitrates Directive are more related to conventional fertilizer management and irrigation.

The Nitrates Directive on the protection of waters against pollution caused by nitrates used in agriculture establishes the obligation to designate all areas as vulnerable areas. Those known surfaces of the territory whose runoff or infiltration contributes to the aforementioned contamination.

The official control networks, as well as the new studies of nitrate content carried out within the framework of the review of hydrological plans, show the existence of new bodies of water that are considered affected and others that are susceptible to being affected if no action is taken in accordance with article 5 of the Nitrates Directive. These facts reveal the need to designate new areas vulnerable to contamination by nitrates of agricultural origin in Andalusia region. Consequently, and in accordance with the current legal system, those agricultural surfaces whose runoff or infiltration causes nitrate contamination have been included in the vulnerable zones catalogue.

In addition, Junta de Andalucía, the regional government, updated the recommendations and requirements to progress towards a more sustainable fertilisation in areas vulnerable to contamination by nitrates from agricultural sources in Andalusia.

One of the main topics is the maximum amount allowed of manure or slurry per hectare, which are set depending on the livestock from which it comes.

Other main modifications refer to the fertilisation limits and the inclusion of nitrogen provided by irrigation water, for the calculation of the final balance in the crop. The restrictions on the amount of nitrogen per ton are extended to all agricultural areas located in vulnerable zones.

3.2.6. Finland

Contribution provided by LUKE, Finland

https://www.luke.fi/fi

In the recent years, total nitrogen input into agricultural fields in Finland has been about 230 000 tons, of which mineral fertilizers constitute about 140 000 – 150 000 tons, manure about 70 000 tons and rest from other recycled fertilizers, biological N2 fixation, seeds, and N deposits. Recycled fertilizers can be produced from various biomasses. Annually about 20 Mt of various biodegradable materials, such as manures, sewage sludges and food processing

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residues are formed. Manures contain nitrogen 73200 tons, followed by sewage sludges (8300 tons), biowaste from food processing industry (6400 tons) and source separated biowaste from municipalities (2200 tons).

Majority of manures is returned to agriculture as such (92.4% of the total manure volume). The main manure processing methods used on farm and larger scale together are composting (4.4%), anaerobic digestion (2.4%), mechanical separation (0.7%) and thermal drying (0.1%). In total, about 7% of manure in Finland is currently processed, but the share is currently increasing. Especially the share of manure into anaerobic digestion is increasing with several farm-scale biogas plants (capacity approx. 5000-12000 t/a) being planned and in investment phase especially on cattle farms and about five large-scale biogas plants (capacity 200 000 – 300 000 t/a, main feed manure) being planned and partly already in investment phase.

Of the other recyclable biomasses a major share is already recycled mainly via anaerobic digestion (e.g. of sewage sludge 76% is digested and about half of the digestate is used in fertilization).

The need for enhancing nitrogen reuse is still very evident. More advanced processing technologies are needed e.g. as post-processing of digestate into concentrated, bio-based fertilizer products. This is also being discussed now during planning of the large manure-based biogas plants which are situated in already dense livestock production areas and require nutrient recycling solutions that ensure reallocation of manure nutrients (esp. P) into regions needing them.

Sources (in Finnis):

http://urn.fi/URN:ISBN:978-952-380-458-6
https://www.luke.fi/fi/tilastot/indikaattorit/ravinteiden-kierratyksen-indikaattori

3.3 Conclusion

Nutrient recycling has been identified as being of key importance in all 6 member states participating in the NOVAFERT project (Belgium, Poland, Ireland, Finland, Spain, Croatia) for a number of environmental (sustainability) and economic reasons. HOWEVER, in terms of nutrient recycling from manure or manure-derived byproducts (e.g. digestate), the Nitrates Directive in its current form still creates unnecessary roadblocks which are hampering the actual implementation of RENURE as was originally proposed by the European Commission itself. Moreover, also other applications of Manure as a resource (towards energy, materials) encounter constraints because of this absence on an end-of-manure strategy. Overall it can be stated that the state-of-technology has evolved over the last 3 decades since the Nitrates Directive was implemented whereas the state-of-legislation has not followed this evolution, thereby constraining sustainable development of agriculture in manure pressure regions.

Nonetheless – the consortium acknowledges the significant importance and positive impact the Nitrates Directive has had up to this point in reconciling agriculture with environmental

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quality. The NOVAFERT project therefore would welcome removing the current roadblocks towards nutrient recycling as caused by Art. 2(g) of the Nitrates Directive and the consequences related to the lack of end-point for processed manure, yet would likewise suggest that the European Commission sets clear guidelines related to application, monitoring, management etc. related to RENURE and go further than merely the compositional criteria which were the outcome of the SAFEMANURE study of the European Commission and the JRC.

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4. Joint Feedback on the Nitrates Directive Evaluation of European Research Projects

ABOUT THE EUROPEAN RESEARCH PROJECTS

Welcome the opportunity to give feedback on the Evaluation of the Nitrates Directive.

The EU has made enormous progress in the implementation of circular economy solutions. Due to a continued commitment to research (2020) and practical implementation (INTERREG), the recovery and use of nutrients from wastes and residues is stimulated and facilitated. This is in line with the new legal framework within the Circular Economy Action Plan (CEAP)[1] (FPR, WFD, CAP- Farm to Fork) under the EU Green Deal[2].

The European Commission has mandated and demanded a number of EU projects across different frameworks (H2020, Horizon Europe, INTERREG) to provide both Europe and the EC with scientific technical evidence and policy-oriented advice, on topics related to circular economy in general and nutrient (re)cycling in particular. In this light, the projects subscribing to the current call feedback call, have joined forces to provide the following Feedback letter. Our feedback compiled feedback is based on the insights from the various project activities.

The Biodiversity[3] and the Farm to Fork[4] strategies set a common objective of reducing nutrient losses in the environment by at least 50% by 2030, while preserving soil fertility. Council Directive 91/676/EEC[5] concerning the protection of waters against pollution caused by nitrates from agricultural sources ("the Nitrates Directive") is a key piece of legislation to achieve this target and other objectives of the EU Green Deal[2].

The Nitrate Directive has been introduced more than 30 ago and has not been amended since. Whereas the goal of the Directive remains relevant, the Directive itself urgently needs to be aligned with other legislation such as the Fertilising Product Regulation and the Animal By-Product Regulation. Nitrates Directive.

The current wording and strict interpretation of the definition of livestock manure, and the delay of the flagship achievement ReNure are seriously obstructing the market entry and use of valuable recycled N-fertilising products. Moreover, it also counteracts other EU goals for circularity that are laid down in other pieces of EU law.

The topics have been taken up by the Policy working group of the European Sustainable Nutrient (ESNI) Community, in which the experts of EU-funded projects in the field of nutrient recycling exchange knowledge and views. https://www.biorefine.eu/nutrient-recycling/.

EU-funded research projects within the ESNI that are active in this field have been involved in these discussions and have committed themselves to the message by undersigning the Joint position with their logos upon formal approval by their respective coordinators. The research project consortia are composed mainly of universities and research institutes, which operate

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independent of market parties and do not aim to represent the views of association or lobbying bodies.

Hence, based on the R&D and policy advise mandate of the subscribing projects, we jointly wish to raise awareness on this burden to market entry of this category of circular N-fertilising products arising from the Nitrate Directive. We come forward with solutions to amend the Nitrate Directive that can and need to be implemented.

4.1 Implementation of the ReNure criterion

The EU is facing environmental challenges and combatting threats to water quality. The Nitrates Directive aims to reduce the contamination of our waters from excess nitrates from agricultural sources. The application of manure is limited by the Nitrates Directive as it inherently results in run-off and leaching because the timing of nitrogen mineralisation from manure cannot be completely aligned with the nitrogen uptake by plants.

This inherent problem can be partially tackled through nutrient recovery techniques. The EU is the front runner in technologies for the recycling nutrients from manure which will help close the nutrient cycle of agriculture. This recovery of nutrients from manure has gained even more urgency, as outlined in recent communication of the Commission on Safeguarding food security and reinforcing the resilience of food systems[1].

Manure treatment can be an effective way to combine the challenges of the circular economy and geographical independence of the EU, whilst preserving our environment and waters. It is considered as the way forward in the latest 4-yearly report by the European Commission on the implementation of the Nitrates Directive [6]: "*Considerable progress has been made regarding the development of manure processing technologies. Recovered nitrogen that replaces inorganic fertilisers reduces CO2 emissions, while recuperated phosphates reduce dependency of imported phosphate rock and remaining organic fractions can be used on local fields. However the most advanced technologies are not yet widely used and there are a number of economic barriers due to the high costs of these processes, the transport costs and the frequent need to pay the farmers for the application of these products on their fields. Furthermore, the maximum level of nitrogen from manure that can be applied under the Nitrates Directive includes also manure in a processed form.*" [6]

The EC-JRC has evaluated a number of these manure-derived products from processing technologies within the SAFEMANURE/ReNure research project [2]. Major outcome of the study was that certain manure-derived products can be safely used as replacement of chemically produced nitrogen fertilisers without increasing risk for nitrate leaching, if a set of strict criteria is followed.. Therefore, products adhering to these ReNure criteria can be safely exempted from the restrictions on the soil application of manure in Nitrate Vulnerable zones (NVZ) as imposed by the Nitrates Directive and National Action Programmes.

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ReNure is considered as one of the four the flagship achievement mentioned in the latest 4-yearly report by the European Commission on the implementation of the Directive (2021) [6]. Yet, the implementation of the ReNure criteria within the current legal framework is still being postponed, posing a barrier to the use of recovered nitrogen. No official explanation is given as to why the implementation of ReNure criterion is being delayed and no time frame or concrete action plan is presented.

Flagship achievement 4 - 'REcovered Nitrogen from manURE': RENURE

The Circular Economy Action Plan[6] promotes the recycling of nutrients from manure and other organic sources to replace chemical fertilisers, whose production is associated to drawbacks of resource management for P[7] or environmental impact for N[8].

While on one side they increase organic carbon in the soil and the soil fertility, organic fertilisers on the other side can release more nutrients in the environment compared with inorganic fertilisers, thus posing higher risks of water and air pollution. The main challenge is therefore to obtain recycled nutrients that minimise losses in the environment.

The Commission Joint Research Centre completed a study[9] on recovered nitrogen from manure and proposed criteria for its safe use above the threshold established by the Nitrates Directive in a similar way as a non organic fertilizer. The concerned materials are called RENURE, from 'REcovered Nitrogen from manURE'. The Commission is currently considering the options for the implementation of this criterion within the current legal framework.

The continuing delay of the ReNure criterion implementation bolsters the often-held view that the Nitrates Directive is used to enforce a decrease in livestock density in certain areas. In nitrate vulnerable zones (NVZ) farmers are not allowed to use the ReNure materials instead of the artificial fertilisers, despite the advantages of ReNure materials and the contribution to other goals of the EU: reduction of CO2 emissions, reduced dependence of the EU on the import of gasses and fertilisers from third countries, circularity and recovery of resources [1], [6], [7].

The delay is undermining the credibility of the Nitrates Directive and diminishing farmers willingness to adopt the measures that are implemented at national level as part of the Good Agricultural Practices Code to decrease nitrate leaching from agricultural fields.

Transparency and reliability are needed to (re)gain farmers trust. Ultimately, it will be the farmers that are applying the Good Agricultural Practices from the Nitrates Directive Action plans. Implementing the ReNure criterion is very much needed to convince farmers that the Commission is indeed supporting the development of manure processing technologies that it is considering it as the way forward and a flagship achievement. As the technologies are

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developed, installations are ready to produce, farmers are in need of nitrogen fertilisers, and the EU needs to decrease the energy consumption by fertiliser production [1], the implementation of the ReNure criteria must not be delayed anymore.

In addition, to create a fair level playing field between the manure processing plants in the different countries of the EU, the criteria for the use of the ReNure products should be transparent. To be reliable, the implementation of ReNure should not be subject to derogation negotiations as the time frame for investments exceeds the 4-year timeline for the Nitrate action plans.

The implementation of ReNure will also align the Nitrates Directive to the goals of the other pieces of legislation under the Green Deal and Circular Economy package, such as the recycling of valuable resources from organic materials, reduction of CO2 emissions and decrease of the geopolitical dependency on the imports of P, energy of synthetic N-fertilisers. In the current situation, the inflexibility of the Nitrates Directive framework is obstructing the achievement of these goals.

Manure-derived N-products that meet the ReNure criterion do not pose an increased risk for nitrate leaching or adverse environmental effects as compared to synthetic N fertilisers. These ReNure products should therefore be exempted from the 170 kg N ha-1 limit that is imposed on manure application following the Nitrates Directive. The Nitrates Directive should be amended accordingly. However, implementation of the ReNure criterion should not be delayed anymore. The ReNure implementation should not await the outcomes of the Evaluation feedback study and a possible following future revision of the Nitrates Directive

4.2 Legal status of Ammonium salts from off-gases

One type of products that result from manure treatment are ammonium salts (ammonium nitrate or ammonium sulphates) that result from the ammonium stripping and scrubbing during manure treatment. DG GROW has implemented legislation with the aim to include these very pure ammonium salts as components for fertilisers.

However, the current strict and broad interpretation of the definition of livestock manure in the Nitrates Directive is blocking the use and market uptake of the ammonium salts.

Under the interpretation of the definition of manure in the Nitrates Directive the ammonium salts could be considered as a manure. The reason to consider the ammonium salts recovered from the off-gases of manure and manure-derived products- as a manure stems from the definition of manure in the Nitrates Directive: *'livestock manure': means waste products excreted by livestock or a mixture of litter and waste products excreted by livestock, even in processed form.*

As processed form is not further defined, this could be interpreted as meaning that the off-gasses would be a processed form of manure. The interpretation of off-gases as processed

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manure is contrary to other EU legislation. Namely, the Animal By-Products regulation, the Fertilising Product Regulation, and the Emission Control Directive, which do not consider manure off-gases a processed form of manure, but instead as an emission that has lost the physical link to the manure.

For example, the Animal By-Product Regulation (EC 2009/1069 and EU 142/2011) defines manure as: "*Manure 'means any excrement and/or urine of farmed animals other than farmed fish, with or without litter', and "Manure-derived product: products obtained from one or more treatments, transformations or steps of processing of manure"*. Here, the term 'processed manure' refers to manure treated with one of the sanitation methods mentioned in Annex IV of the Animal By- Product Regulation.

Furthermore, ammonium salts from off-gases are high quality products which can be used as a component material for the production of EU fertiliser under the regulation EU/2019/1009. This CMC 15 RECOVERED HIGH PURITY MATERIALS includes:

"recovered high purity material, which is ammonium salt, sulphate salt, phosphate salt, elemental sulphur, calcium carbonate or calcium oxide, or mixtures thereof, of a purity of at least 95 % dry matter of the material. The high purity material shall be recovered from waste generated from: "…" (b) a gas purification or emission control process designed to remove nutrients from off-gases derived from one or more of the following input materials and facilities: "…" (viii) manure within the meaning of Article 3, point 20, of Regulation (EC) No 1069/2009 or derived products thereof; or (ix) livestock housing facilities."

Following this wording, the ammonium salts from off-gases of manure or manure-derived products are considered as materials that are recovered from emission control processes, not as part of the manure processing. This was also explained by the JRC-report on the criteria for high purity materials recovered from waste (CMC 15):

"Off-gases of manure are not covered under the Regulation (EC) No 1069/2009 on animal by-products, and fall within the scope of this CMC WW/15."

This is underlined by the Commission Expert group on Fertilising Products in their FAQ [4]:

" 5.12 Are high purity materials out of off-gases generated by manure derived products within the scope of the Animal by-products Regulation?

No. Off-gases from manure are not animal by-products or derived products within the scope of the Animal by-products Regulation, as defined in Article 2 of that Regulation. Therefore, the recovered high purity materials out of such off-gases are not within the scope of the said Regulation either and no end-point in the manufacturing chain has to be determined under the animal by-products rules for the use of such materials in EU fertilising products."

This opinion of DG GROW is in line with the statement from DG SANTE (Health and Food Safety) [5]:

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"question on nitrogen recovery from off-gases from manure treatment, manure storage, or livestock stables I confirm that off-gases from manure are not subject to Regulation (EU) No I 069/2009, since emissions are not within the scope of that Regulation."

Despite the Animal By-Products regulation and the Fertilising Product Regulation make it clear that products from manure off-gases are not manure, some member states do consider these products as animal by-products (ABP) and manure using a very strict interpretation of the manure definition in the Nitrates Directive. This severely restricts their recycling in the circular economy. Therefore, all DGs, member states, and the EC must urgently adopt an unambiguous definition of ammonium salts recovered from manure off-gases and manure treatment processes to clarify their legal status.

Because of the unambiguity arising from the unclear interpretation of the definition of manure in the Nitrates Directive, the legal status of ammonium salts differ between the EU countries. Some EU countries consider the ammonium salts as waste-derived pure products (in line with the logic of the FPR and the ABP-regulations, where the scrubbing salts are seen as waste product from purification of off-gases, (EG 1069/2009 on animal by-products).

Other member states make a distinction:

- Ammonium salts derived from scrubbing of air from stables are considered waste that are derogated to be used as a fertiliser. The ammonium off-gases in the stable air -emitted as a natural process- are considered to have lost the direct physical and chemical link with the manure.

- However, if the ammonium salts are derived from scrubbing and stripping of emissions to air that is originating from processing manure or derived products (controlled emission) they are considered to remain a manure product and hence an animal by-product. The argument that the ammonium off-gasses have lost the direct physical and chemical link to the manure treatment product that they originate from is not followed here.

Furthermore, the manure-ABP status does not contribute to the goals of the Nitrates Directive to protect water quality. As ammonium salts recovered from off-gases are defined as ReNure products and have been evaluated as equivalent to chemical fertilisers and safe to be exempted from the 170 kg N ha-1 application limit of the Nitrates Directive. In effect, the ReNure status should be seen as an 'end-of-manure' under the Nitrates Directive. Therefore, it is unnecessary to confer the status of manure or animal by-product to the ammonium salts under the Nitrates Directive.

The manure/ABP status limits market uptake as it poses a complex set of prerequisites on transport, handling and storage of the products (laid down in EC 1069/2009 and 142/2011) and requires registration, approval, control and certification of all facilities, vehicles, and actors along the market chain. This forms a logistical and administrative burden that further complicates and

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hinders the market entry and acceptance of the products. The different interpretation between member states also causes an unfair level playing field for producers in the different countries.

The difference in interpretation of the legal status of the ammonium salts has far reaching consequences that will not be solved by the implementation of the ReNure criteria or inclusion in FPR CMC 15! A clear statement from DG ENV is needed to clarify that ammonium salts originating from off-gas processing does not belong under the definition of livestock manure under the Nitrate Directive and is not to be considered as a manure.

Harmonizing the views regarding the status of ammonium-salts originating from off-gas cleaning between the various branches of the European Commission (DG GROW, DG SANTE, DG ENV, DG AGRI) and member states is a prerequisite for circular economy processes and associated products to enter the market as sustainable, renewable alternatives to synthetic nitrogen fertilizers which are produced from conventional chemical processes using fossil resources (natural gas).

In concreto, the views expressed in the various documents and communications by DG GROW [4] and DG SANTE [5] are supportive of this transition, whereas ambiguous interpretation towards the remaining status as 'manure' for such products *vis-à-vis* the Nitrates Directive in other proclaimed positions by the European Commission may hinder or delay the transition towards more circularity in mineral nitrogen flows in European agriculture.

The Nitrates Directive should be amended to align with other pieces of legislation, especially on the definitions of manure, processed manure, and manure derived products.

In the short term however, DG ENV needs to make a clear statement -aligning with DG GROW and DG SANTE- that the ammonium salts derived from off-gases of manure or manure treatment processes are not to be interpretated as a manure in processed form under the Nitrates Directive.

Link to the document: Joint feedback on the Nitrates Directive Evaluation - Biorefine Cluster Europe

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5. Conclusion

The observed barriers towards implementation of RENURE in the follow-up of the recommendations issued by the JRC (under mandate by the EC-DG ENV) and the fact that the state of European legislation is lagging on the state-of-technology is causing frustration amongst stakeholders willing to invest in making agriculture more sustainable. Hence, we considered this concern to report in our initial policy brief.

This is the first one among four policy briefs that NOVAFERT will prepare throughout the project period. Also, the benefits of digestate as a category of more efficient and beneficial fertilizing product (as well as derivatives from digestates) will be highlighted in the second policy brief. Further policy brief on soil health is under development. The remaining policy brief will be written based on the results of a regional SWOT analysis and regional action plans in which farmers and other stakeholders addressed the strengths and challenges they identified in implementing BBF and will be published by the project's third year (2025).

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