

# Cross-border trade: certification schemes for recycling derived organic fertiliser (RDF)

Bur, A.<sup>1\*</sup>, Laub, K.<sup>1</sup>, Weiler, K.<sup>1</sup> and Wern, B.<sup>1</sup>

<sup>1</sup> IZES gGmbH, Altenkesseler Str. 17A, 66115 Saarbrücken, Germany

\*corresponding author; e-mail: [Bur@izes.de](mailto:Bur@izes.de)

**Abstract** The project ReNu2Fam (Nutrient Recycling – from pilot production to farms and fields, funded by the EU Interreg North-West Europe Program) focuses on closing nutrient cycles to substitute mineral fertiliser and to contribute to a sustainable agriculture by supporting demand-oriented application of recycling derived nutrients.

The implementation of EU Fertiliser Product Regulation (EU 2019/1009) is a big step to close nutrient cycles and to strengthen the circular economy use of high-quality recycling-derived fertiliser products (RDF's) as a CE marked product on the free market of the EU. As this adapted EU regulation is still not in force and also not covering all innovative RDFs or components of it, the current situation is still hampering the European transborder market introduction of RDFs and some of its components. For more market uptake of RDFs and its components, quality assurances for the production, processes and the end-product needs to get uptaken normatively. Additionally, contamination limits (impurities and heavy metals) but also nutrient content and plant availability must be defined for more transparency for RDF users (Egan & Power 2020). Beside the European CE marking, the fertilizer producer can still choose to comply with national standards and sell the product to other EU countries on the basis of mutual recognition. Voluntary certification schemes are supportive to proof compliance for sale and marketing.

ReNu2Fam highlights the benefits of RDF and proposes criteria for RDFs and designated fertiliser components to ease trade within the European single market. At the example of the RDF STRUBIAS, the legal status is portrayed, that is supposed to enhance consumer's trust and market uptake. This should help to build up trust in recycled fertilisers and prospectively help to substitute mineral fertiliser by RDF.

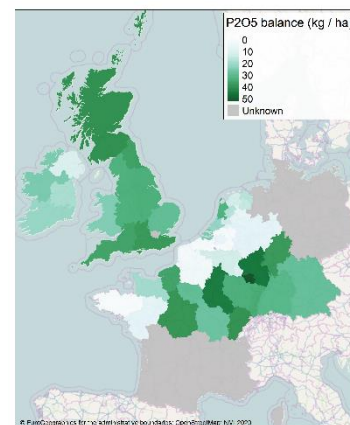
**Keywords:** EU Fertiliser Product Regulation, Nutrient Circles, Circular Economy, Certification Scheme, European single market

## Introduction

Closing nutrient cycles to substitute mineral fertiliser and to contribute to a sustainable agriculture by supporting demand-oriented application of nutrients is the focus of the project ReNu2Farm. Therefore, ten partners from Northwest Europe have been researching on recycled derived fertiliser to push the visibility and awareness, to

prove good plant availability and nutrient supply and to point out possible strategies for a successful market entry.

The project has mapped nutrient surplus and demand areas within the target regions. For this, the crop farming context for regions of Northwest Europe was analysed. The crops being cultivated, the soil type and nutrient status in terms of Nitrogen, Phosphorous and Potassium, as well as fertiliser recommendations and limitations have been taken into account. The results of this research have been mapped to show regional differences.



**Figure 1.** Map of phosphorous demand and surplus region (<https://renumaps.nmi-agro.nl/>)

The map displays, that some surplus regions often border on demand regions. As shown in picture 1, Germany has a strong demand on P-fertiliser in Saarland and Rhineland-Palatinate. In Belgium, just across the border, there is a phosphorous surplus. Compost, sewage sludge and different fertiliser on the base of sewage are RDF with a high content of phosphorous (Waida et al. 2013) are available on both sides on the border. But trading recycling derived fertiliser (RDF) between two European countries is still difficult. A major problem for free trade is the waste status that still applies to most of the organic recycling derived fertilisers (see Postma & Van Schöll 2020). Furthermore, the acceptance of RDF by farmers is only given, if a high quality of the nutrient value and environmental benefit is transparent (Egan & Power 2020; Bonnichsen et al. 2020). This limits even more the market entry perspective for RDFs.

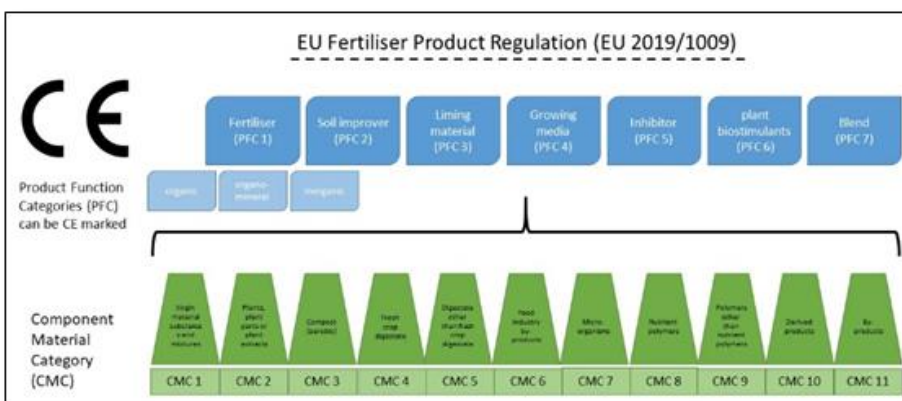
## RDF Certification schemes – status quo

In 2019, the European Union released the Fertiliser Product Regulation (2019/1009) that has been approved on June 5, 2019 and shall apply from 16 July 2022. The aim of the regulation is to extend the scope of the Regulation (EC) No 2003/2003 to include for the first time e.g. fertilising products made of organic wastes with harmonized quality standards to be tradable across European markets. Herewith, the European Union responded to the necessity in the European agrarian sector to allow the transboundary market entry for recycled organic fertilisers. The previous regulation addressed the market uptake in particular for mineral fertilisers, mostly mined and chemically produced abroad. Enabling most of the RDF to receive the end-of-waste status (product status) by law is going to boost their widespread market uptake, promote the development of the circular economy and strengthen Europeans independency on importing nutrients from abroad countries.

The EU Fertiliser Product Regulation covers a wider range of fertilisers (organic, inorganic & organo-mineral), soil improver, liming material, growing media, inhibitor, plant stimulus and fertilising product blends (Figure 2). EU fertilizing products are allocated to Product Function Categories (PFC) with particular quality and safety requirements (Annex I). Also the components of the fertiliser products are defined in eleven Component Material Categories (CMC) with separate process and control mechanisms. Also limit values for heavy metals and other contaminants are defined on PFC level. Complying with these European quality, safety and environmental criteria, the addressed fertilising products can receive a CE certification, harmonizing the European market for bio-based fertilizer sales.

As member state specific regulations are not overruled by this EU Fertiliser Product Regulation, the designated fertilizer product can alternatively comply with the specific member state regulation and so be branded and sold to other EU countries on the basis of mutual recognition.

As an example for most known RDFs, compost and digestate investigated within the project are currently able to get a CE mark within the scope of the regulation. They can be classified as PFC 1 A) I) organic fertiliser (solid) or PFC 3 A) Organic soil improver.



**Figure 2.** Product Function Categories and Component Material Categories within the EU Fertiliser Product Regulation

## General purpose of certificates

The main aim of certification schemes is to build up and enhance trust in a certain product. Most of them are not mandatory, e.g. setting stricter criteria than legal norms. In general, certification schemes underline defined quality standards, which are ensured within the whole value chain through a steady and traceable monitoring system.

Certification schemes provide quality and assessment assurances, determined in certification scheme manuals. This usually contains a restricted table of allowed base products. These base products shall neither harm human health nor bear any environmental risk. Moreover, the manual defines rules and condition for the production process and quality measures for the final product. Additionally, a certification scheme manual suggest application forms that follow a good practice standard.

## Status quo on certification schemes for project RDFs

Especially for products that base on waste material such as RDFs, a well introduced certification scheme will support the uptake on the market and an enhanced acceptance of the end-user. Certification schemes for recycling derived fertiliser can be only applied if the fertiliser is approved and embedded within the national legislation. Table 1 provides an overview, if the project target region set up a national legislation on the specific recycling-derived fertiliser.

**Table 1.** Existing legal framework of RDF (van Schöll & Postma 2020)

|             | Compost | Digestate | Ashes          | STRUBIAS |
|-------------|---------|-----------|----------------|----------|
| Belgium     | +       | +         |                |          |
| France      | +       | +         | +/-            |          |
| Germany     | +       | +         | +<br>(limited) | +/-      |
| Ireland     | +       | +         | -              |          |
| Netherlands | +       | +         | +              | +        |

Within the European Union and especially in the target region of the Interreg NWE project ReNu2Farm, different certification schemes for certain RDF do already exist. The most common RDF that is certified is compost. Every country in the target regions uses at least one certification

scheme to ensure quality standards for compost. Already in the 1980s, a German initiative evaluated the possibilities of a certification scheme and discussed benefits for producer and consumer. It took the initiators almost a decade until the

association GÜTEGEMEINSCHAFT KOMPOST was founded and an application for a RAL quality seal (German Institute for Quality Assurance and Certification) was completed (Funke 2016). Also

France became one of the first countries to announce compulsory standards for organic waste compost through the French Rural Code (Compost vert NF U 44-051 and NF U 44-095). This has supported the development of the circular economy in France.

In the project also ashes from incineration or gasification of sewage sludge and/or animal manure, liquid products (e.g. ammonia or nitrogen stripping) and struvite have been analysed as RDFs. These RDFs are not yet fully covered by the current version of the EU Fertiliser Product Regulation but the intention to integrate these materials (struvite, biochar and ash-based products) has been noted in paragraph (19) of the regulation. Therefore in January 2021, a draft of an amendment to the Product Fertiliser Regulation was published and a consultation process was started. In the following chapter a brief summary of the development of the process for the RDF STRUBIAS will be given.

#### *Including STRUBIAS into certification schemes*

STRUBIAS is an acronym that was created by the European Joint Research Centre to cover a research on STRUvite, BIOchar, or incineration AShes on the basis of waste materials to create new fertilising material and to evaluate the conditions of integrating those in the Fertiliser Product Regulation. During the scope of the project the focus was expanded to additional materials (see Huygens et al. 2019).

#### *Recommendation of the Joint research Centre (JRC)*

JRC has analysed the technical and market settings as well as the legal framework for the manufacturing and market placement of these fertilising products derived from biogenic wastes and other secondary raw materials (see Huygens et al. 2019). They have concluded that especially phosphorus gained from several STRUBIAS material can be an alternative for rock phosphorus. JRC emphasize that several STRUBIAS materials are potential fertiliser components according to the EU Fertilising Product Regulation (EU 2019/1009). The usage of these materials as fertilisers can have different functions: inorganic and organic fertilisers, liming materials, growing media, soil improvers, plant bio-stimulants and fertilising product blends. JRC proposed quality requirements and quality assurance of STRUBIAS that have potential to be integrated within the legal framework of the EU Fertilising Products Regulation (EU 2019/1009).

#### *Struvite usage within the ReNu2Farm target regions*

Besides the above mentioned common RDF, the Netherlands and Germany exceptions for the usage of struvite as fertiliser. Regained phosphates including struvite is formalized in a category of the Fertiliser Act of the Netherlands. A detailed description of the category is laid down in the 'Implementation Decree' and the 'Implementation Regulation'. All other fertiliser on basis of residue and waste products have to register on a positive list and authorized.

In the Netherlands, struvite is approved as a fertilising product since 2015. Already in 2011, the Dutch

phosphorus platform has supported this policy and pushed the political change towards a circular economy law.

The amendment of the Fertiliser Product Regulation assigned CMC 12 (a new CMC) to struvite. Input material is defined.

The phosphate salts shall contain:

- a minimum of 16 % of P<sub>2</sub>O<sub>5</sub> dm
- a maximum organic carbon content of 3 % dm
- no more than 3 g/kg dm of impurities above 2mm of organic matter, glass, stones, metal, plastics (no more than 5 g/kg in sum).

Struvite and other phosphate salts might also be an EU fertiliser product. Therefore, limit values for heavy metals salmonella and Escherichia coli bacteria are given. Module D1 is applied for quality assurance of the production process).

The process of amendment is still ongoing. The possibility to feedback the political debate is closed and the regulation will be revised. It is planned that the amendment will apply in July 2022.

#### *Certification scheme for struvite and other RDF*

Struvite and other recovered phosphates can be both: a raw material for fertiliser production (CMC) and a fertiliser product (PFC) (described above). It seems that the criteria applied with the quality assurance protocol (Module D1) are not eligible. This fact will hamper the development of a cross border market for struvite.

The Dutch company AquaMinerals (2021) has stated in the feedback process on the amendment that consequently national end-of-waste criteria in all countries are needed to ease cross-border trade.

#### **Conclusions**

A certification scheme can support the marketing of struvite as well and will enhance the acceptance by fertiliser user by implying the following criteria and key messages:

1. Using recycling-derived fertiliser (e.g. struvite, compost and digestate) helps to close nutrient cycles and minimize dependency on rock mineral. It reduces land mining and supports a more climate friendly agriculture.
2. Consumer trust is important because it is the base for a successful market introduction. Therefore, it has to be shown that RDF do not harm human health or the environment.
3. Transparency always helps to build up trust. A transparent production process where all steps during the value chain can be accessed and evaluate is important.
4. The content of heavy metals and other contaminants have to be limited. Scientific and application-oriented test have to verify the quality.
5. For agrarian sector it is important to have knowledge of the nutrient value. A definition of

the minimum of nutrient helps the applicant to decide to use a recycling derived fertiliser.

Besides certification scheme positive framing is necessary to enhance acceptance of RDF and especially struvite. Lichtl advises to phrase the positive impacts on environment and fertilising effects. Despite to the safe usage of RDF highlighting input material might be contractively (Lichtl 2020).

Synergy between circular economy and climate protection targets are strongly interlinked on European level (see Dube 2020). Just recently a position paper of DGAW (Deutsche Gesellschaft für Abfallwirtschaft) has been published that emphasises the importance of recycled nutrients to minimize independency on mineral fertiliser and to support the circular economy in this sector (DGAW 2021).

As described in this article a certification scheme strengthens the integration of RDF in the market and will be one contribution to reduce trans-border barriers.

## References

- AquaMinerals 2021: Feedback to Draft delegated regulation – Ares(2021)44195 and Annex - Ares(2021)44195:  
[https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12163-Fertilising-products-precipitated-phosphate-salts-and-derivates\\_en](https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12163-Fertilising-products-precipitated-phosphate-salts-and-derivates_en)
- Bonnichsen, O.; Jacobsen, B.H.; Tur-Cardona, J. (2020): Danish farmers' preferences for bio-based fertilisers – a choice experiment. IFRO Working Paper 2020/15, DEPARTMENT OF FOOD AND RESOURCE ECONOMICS, UNIVERSITY OF COPENHAGEN
- DAGW 2021: DAGW-Positionspapier: Biogene Reststoffe – ein wesentlicher Stoffstrom für eine nachhaltige Kreislaufwirtschaft und Bioökonomie. 09.03.2021.
- Dube, R. 2020: Europa muss weltweite Vorreiterrolle in der Kreislaufwirtschaft ausbauen. Müll und Abfall. 6/2020.
- Egan, A.; Power, N. 2020: Acceptance of Recycling Derived Fertilisers by Farmers / Stakeholders. Working Paper, Published by Aoife Egan and Niamh Power, Cork Institute of Technology, Bishopstown, Cork, Ireland
- FNADE 2014: FNADE Position – Revision of the EU Fertiliser Regulation.
- Funke, U. 2016: Anfänge der Gütesicherung. 25 Jahre Gütesicherung. Mai 2016
- Huygens D, Saveyn HGM, Tonini D, Eder P, Delgado Sancho L, Technical proposals for selected new fertilising materials under the Fertilising Products Regulation (Regulation (EU) 2019/1009) - Process and quality criteria, and assessment of environmental and market impacts for precipitated phosphate salts & derivatives, thermal oxidation materials & derivatives and pyrolysis & gasification materials, EUR 29841 EN, Publications Office of the European Union, Luxembourg, 2019, ISBN 978-92-76-09888-1, doi:10.2760/186684, JRC117856.
- Kay, S., Marcoveccio, F., Raymaekers, F. (without year): INEMAD - Working Paper 18: Digestate and Organic Fertilisers Certification in Europe: a plea for a common system, IZES, Saabrücken.
- Kraus, F. Et al. 2019: Ökobilanzieller Vergleich der P-Rückgewinnung aus dem Abwasserstrom mit der Düngemittelproduktion aus Rohphosphaten unter Einbeziehung von Umweltfolgeschäden und deren Vermeidung. Bundesumweltamt. Dessau-Roßlau. <https://www.umweltbundesamt.de/publikationen/oe-kobilanzieller-vergleich-der-p-rueckgewinnung-aus>
- Lichtl, Martin 2020: Biotonnen-Barcamp. Ergebnisbericht Müll und Abfall. 6/2020
- Postma, R., Van Schöll, L. (2020): Legal framework for recycling derived fertiliser products in EU. ReNu2Farm Report. (unpublished manuscript).
- Van Schöll, L., Postma, R. (2020): Country specific requirements for transfrontier transport and use of recycled fertilisers in NW Europe. ReNu2Farm Report. (unpublished manuscript)
- Waida, C. et al. Phosphor-Recycling. Positionspapier. Bundesgütemgemeinschaft Kompost e.V. Köln. [https://www.kompost.de/fileadmin/docs/HuK/5.4.6\\_Position\\_P-Recycling\\_oktober\\_2013.pdf](https://www.kompost.de/fileadmin/docs/HuK/5.4.6_Position_P-Recycling_oktober_2013.pdf) (last viewed May 2021)
- REGULATION (EU) 2019/1009 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 June 2019 laying down rules on the making available on the market of EU fertilising products and amending Regulations (EC) No 1069/2009 and (EC) No 1107/2009 and repealing Regulation (EC) No 2003/2003
- REGULATION (EC) No 2003/2003 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 October 2003 relating to fertilisers