Events

Phosphorus use and recycling in intensive livestock: 5-7 March 2025

This event will focus on making livestock production, animal feed, and manure and digestate management more circular. The workshop will help create a UNEP report on sustainable nutrient use in livestock farming.

How can we balance efficient nutrient management in intensive livestock farming with social benefits (such as lower prices and regional agri-food specialisation) while tackling nutrient imbalances in certain areas?

- Location: Saint Malo, Brittany (with some sessions online)
- Topics Covered: • Sustainable livestock nutrient management • How nutrients move in livestock production, • The impact of different diets on nutrient use, • Animal feed, farming methods, and nutrient footprints, • Life cycle analysis (LCA) of livestock production, • Recycling and reusing manure nutrients
- Participants: Experts from UNEP (United Nations), the European Commission (DG AGRI, DG RTD), livestock farmers, meat producers, the agri-food industry, environmental organisations, and researchers.
- Organisers: UNEP uPcycle, Roullier (fertilisers, animal nutrition, food industry), Cooperl (Brittany pig farmers and pork industry solutions), ESPP, BETA Technological Center, UK Centre for Ecology & Hydrology (CEH).

In-person participants have the opportunity of site visits:

- Roullier's Global Research Centre (fertilisers and agriculture)
- Minerallium, a unique experience exploring minerals from Earth's origins to plants, animals and humans
- Cooperl's waste to resource vision and processes, with the Bulle Environment immersive showroom
- Couiclang pig farm, state-of-the-art pork production sustainability

On-site participation limited to 60 persons to enable active discussion, white paper drafting, site visits.. Wed. 5 – Fri. 7 March 2024, Saint Malo, France (Brittany coast, 1 hour from Rennes high-speed train station and airport) and partly online. Online access will include plenary presentations. To participate in discussions and white paper, we recommend in-person attendance. To request to participate in Saint Malo, pre-register now. https://phosphorusplatform.eu/LivestockBrittany

13th March 2025: EU sewage phosphorus "reuse & recycling" targets

The requirements of the new EU Urban Waste Water Treatment Directive 2024/3019 (UWWTD) for phosphorus removal, reuse and recycling: interactions between tighter discharge consents, chemical P-removal coagulants, P-recovery. With the European Commission (ongoing work defining UWWTD phosphorus "reuse and recycling rates"). Showcase of leading technologies to recover phosphorus sewage, and how these interact with iron/aluminium content, vivianite recovery and processes to recover phosphorus from vivianite, plant availability of phosphorus in sewage sludges. Within Aquatech, Europe's biggest water industry trade show.

13th March 2025. In Aquatech, Amsterdam RAI and online. Programme and registration https://phosphorusplatform.eu/AquatechWorkshop

NOTE: for onsite workshop participation, separate prior registration for both Aquatech (free access) https://www.aquatechtrade.com/amsterdam and for the workshop here are necessary

10-12 June 2025, Bergen, Norway, nutrients in aquaculture and fisheries

ESPP workshop, with partners in Norway and UNEP uPcycle, on nutrient management in aquaculture feed, seafood processing and fish sludge valorisation, Norway & online, 10-120June 2025, covering nutrient flows, environmental best practice, phosphorus recycling, regulatory challenges. The workshop will contribute to the United Nations (UNEP) project uPcycle, leading to a UNEP white paper on phosphorus sustainability in aquaculture.

If you wish to contribute, please email indications of your organisation's areas of interest, competence, possible content of presentation, to info@phosphorusplatform.euThe outline programme will be available soon.

15-17 October 2025, Wageningen, NL. RAMIRAN: the manure management event

Abstract deadline 15th February. Europe's leading manure and organics conference. Managing organic resources in agriculture: opportunities and challenges. 250 participants in 2023 (see ESPP's SCOPE Newsletter n°149). Covers organic nutrient utilisation, air and water emissions, manure processing technologies, policy & regulation, with particular focus on nutrient use efficiency, nutrient recycling and manure climate emissions.

Organised by ESPP member Wageningen WUR. www.ramiran2025.nl

EU consultations

Evaluation of EFSA

Public consultation open to 1st April 2025 for the evaluation of EFSA (European Food Safety Agency). Public questionnaire (second stage consultation) asks for input on the importance of EFSA's objectives (providing scientific advice, risk communication, cooperation with stakeholders and Member States, identifying emerging risks), effectiveness of EFSA and EU added value, aspects such as independence or openness, different work areas (animal health, biological hazards, contaminants in the food chain …), quality and clarity. Specific questions address links to the new (2021) EU Transparency Regulation framework.

Questionnaire plus possibility to input general or specific comments (max. 5 000 characters) and/or upload documents or input papers.

"European Food Safety Authority – evaluation of performance 2017-2024", EU public consultation open to 1st April 2025 https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14068-European-Food-Safety-Authority-evaluation-of-performance-2017-2024/F_en

Evaluation of public procurement directives

EU consultation open to 7th March for the evaluation of the three EU public procurement directives (Public Procurement 2014/24/EU, Procurement by utilities 2014/25/EU, Concessions 2014/23/EU). This first stage consultation ('Call for Evidence') asks for free input on the effectiveness, relevance, coherence and EU added value of these directives, in the context of the European Court of Auditors report 2023 which points to decreasing competition in public procurement and the Enrico Letta report April 2024 "Much more than a market - Speed, Security, Solidarity – Empowering the Single Market to deliver a sustainable future and prosperity for all EU Citizens". ESPP notes that these public procurement directives currently prioritise the lowest cost option (e.g. art. 67.1 of 2014/24/EU "most economically advantageous"), subject to respecting environmental obligations (art. 18.2) but with option (only) of taking into account the "price-quality ratio … on the basis of criteria including environemental aspects" (art. 67.2), where environmental externalities can be taken account only if "monetary value can be determined and verified" (art. 68.1.6).

Input: free 4 000 character text plus possibility to upload a fee document.

"Public procurement directives – evaluation", EU public consultation open to 7th March 2025 https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14427-Public-procurement-directives-evaluation_en

EU fertiliser imports

Limited EU proposal for tariffs on Russian fertilisers

The European Commission has proposed a c. 13% tariff on some fertiliser imports from Russia and Belarus and also an extension of the existing 50% tariff on Russian cereal an oilseed imports (2024/1652) to a wider range of agricultural products. The proposal will now be considered by the European Parliament and Council (Member States). The Commission estimates that the EU imported 1.3 bn€ of fertilisers from Russia in 2023. This is similar to the pre-tariffs value of 2023 EU imports of Russian grains and oilseeds. Tariffs proposed on some fertilisers are 40 – 45 €/tonne until June 2026 (c. 13% of value, additional to the existing 6.5% tariff on all fertiliser imports), doubling in June 2027, then becoming "prohibitive" (c. 100%) in June 2028. For comparison, the USA recently announced 25% tariffs on many imports from Canada (10% on energy). The EU's proposed tariffs would apply to mineral N, NP and NK fertilisers from Russia or Belarus, but not P or K fertilisers (customs codes 3103, 3104). The fertiliser types subject to proposed tariffs represent over 2/3 of EU fertiliser use (the proportion of such fertilisers from Russia covered is not specified). The tariffs would not impact transit of the targeted goods from Russia or Belarus to third countries, i.e. do not impact trade of these goods through Europe, transport, insurance, storage in Europe. The Commission says that the proposals aim to support the EU fertiliser industry and agriculture and allow for diversification in countries supplying imports, whilst ensuring fertiliser availability at an affordable price for farmers, and without impacting supplies to developing countries or global food security.

ESPP notes that the proposed tariffs on fertilisers are relatively low and will have a limited impact until June 2028. This means that significant financial flows - potentially exceeding a billion euros - may continue towards Russia for fertiliser purchases, including through taxpayer-funded CAP support for farmers. Meanwhile, the EU fertiliser industry faces challenges that could affect its long-term viability and, in turn, EU food security. ESPP recommends that the EU actively support farmers in sourcing recycled, green, or EU-produced fertilisers (with lower environmental footprint) and consider stronger trade measures on fertilisers from Russia and Belarus. Additionally, ESPP highlights the absence of phosphate fertilisers in the current tariff proposal, despite phosphate being listed as an EU Critical Raw Material and the EU relying on imports for around 90% of its supply, with a significant portion still coming from Russia.

Fertilizers Europe welcomed the proposal for tariffs on Russian fertilisers: "For too long, the European fertilizer industry has been exposed to artificially low-priced imports from Russia and Belarus, seriously distorting the market and undermining fair competition. Consequently, the Russian share of EU Nitrogenous fertilizer imports reached a 5-year high, while urea imports volumes from Russia reached a 10-year high.". Fertilizers Europe however also considers the proposed tariff levels too low too slow, suggesting a 30% tariff immediately.

"Commission proposes tariffs on remaining agricultural products and on fertilisers from Russia and Belarus", European Commission, 28 January 2025 https://ec.europa.eu/commission/presscorner/detail/en/ip_25_340 and proposed tariffs regulation COM(2025) 34 final, 2025/0021 (COD) https://ec.europa.eu/transparency/documents-register/detail?ref=COM(2025)34&lang=en

"Fertilizers Europe welcomes the European Commission's proposal to impose tariffs aimed at reducing EU dependency on fertilizers from Russia and Belarus, Calls for Greater Ambition", Fertilizers Europe, 29 January 2025 https://www.fertilizerseurope.com/wp-content/uploads/2025/01/Fertilizers-Europe_Press-Release_Tariffs-on-Russian-Belarusian-fertilizers_29-01-2025.pdf

Circular Economy policy

BusinessEurope priorities for Circular Economy

Industry says it is committed to accelerating the Circular Economy for a cleaner and more competitive Europe and identifies incentives and regulatory changes needed to ensure the business case for circularity and maintain Europe as world leader in circular economy products and solutions. BusinessEurope sees as barriers: inadequate infrastructures for collection and sorting, lack of information sharing along value-chains, lack of demand for circular products, regulations inhibiting cross-border movement of wastes for recycling, obstacles to recycling scale-up, lack of harmonised EU End-of-Waste criteria and divergent national requirements and admnistrative burdens. Priorities for action include:

- policy coherence and implementation: avoidance of legislative contradictions, reducing admnistrative burdens, implementation tools and information, knowledge sharing, harmonising legislation between Member States, effective enforcement and market surveillance (ensuring a level playing field vis-à-vis imports into the EU)
- specific regulatory actions: free movement of materials for recycling, facilitating testing and demonstration, further develop EU End-of-Waste criteria
- circular economy Standards
- R&D funding for circular economy industry focal areas
- EU-level targets for recycled and bio-based contents for relevant materials, for separate collection, sorting and waste processing
- reinforce Green Public Procurement to support circularity
- update Extended Producer Responsibility fees to reward product durability, recycled content, …
- appropriate use of digital tools, such as product passports, whilst ensuring focus on data relevant for circularity to avoid unnecessary administrative burden

"EU Circular Economy Policy. BusinessEurope priorities for 2024-2029", 10th July 2024.

EESC calls for policies to move "from waste plants to resource plants"

European Economic and Social Committee Opinion calls for financial support and regulation to develop recycling and resource recovery, specifically citing nutrient recovery from wastewater, sludge and other sources. EESC says that a "shift from linear product-to-waste thinking to waste-to-resource" is needed and a "revised strategy" at the EU-level to forward recycling and resource recovery projects, in close cooperation with regional and local authorities and in coherence with the Waste Hierarchy. Market conditions must be adjusted to level the playing field between recycled and virgin materials The need to modify waste regulation is noted, including regulating waste "as a key raw material" with standards under REACH, End-of-Waste Criteria, harmonisation of standards for recovered materials and management of cross-border shipments. It is noted that this requires management of waste at the EU rather than national level, with appropriate and flexible chemical regulations and site permitting (Industrial Emissions Directive). Regulation should be revised where it currently prevents the use of recycled materials and recovered nutrients in various sectors (inc. agriculture and organic farming, animal rearing, aquaculture) and "should prioritise product quality over origin". EESC also calls for use of innovative technologies, upskilling of the workforce including health and safety and sustainability training and for financial support, e.g. through a pollution fee to support recycling costs, through European Investment Bank financing for integration of resource recovery into waste management and with R&D and pilot project funding. EESC "strongly supports maximising nutrient recovery from wastewater, sewage sludge and other sources, through best-practice treatment, recycling and through resource recovery methods aimed at capturing valuable minerals", recommends that recovery targets be set for phosphorus and nitrogen and that the Critical Raw Materials Act should focus more strongly on recycling. Recovery of potassium is also cited, including from incinerator ashes is also cited.

"From waste plants to resource plants", Own-Initiative Opinion of the European Economic and Social Committee, CCMI/228, rapporteur Anastasis YIAPANIS, co-rapporteu: Michal PINTÉR, 23rd October 2024.

ESPP new members

STEPS Science and Technologies for Phosphorus Sustainability Center

STEPS is an academic research centre supported by the U.S. National Science Foundation addressing key knowledge and technology gaps in P sustainability. STEPS is headquartered at North Carolina State University, USA, and engages 10 other partnering institutions in convergence research that integrates disciplinary contributions across the physical, life, social, and economic sciences with stakeholders across sectors and scales. Research within the STEPS Center draws from atomic and molecular insights (e.g., chemistry, materials research, biochemistry, bioengineering) to develop materials and technologies that are deployed at the human scale (e.g., environmental and agricultural engineering, plant biology, crop and soil sciences) while considering supply-chains, life cycle, and other regional and global issues (e.g., ecology, economics, sociology, policy). STEPS further supports research projects that transcend length scales (e.g., science of team science, informatics and AI, education research, outreach). As a U.S. leader in P sustainability, STEPS produced an initial roadmap for P sustainability in the U.S. in 2023 by convening stakeholders in working groups and will update the roadmap in future years. STEPS also recently launched a Partners Program to grow the community both within the U.S. and internationally and to facilitate outreach, technology transfer, and commercialization. By joining ESPP, we aim to grow our networks and to enhance phosphorus sustainability globally.

https://steps-center.org/

REALM Reusing Effluents from Agriculture to unLock the potential of Microalgae

The Horizon Europe funded project REALM aims to use microalgae to turn nutrient-rich water from greenhouses and soilless agriculture into valuable resources, with decentralised and automated systems. The on-farm cultivation includes nutrient removal and CO_2 fixing by microalgae, water recycling, automation of cultivation (raceway ponds, tube bioreactors) and microalgae harvesting. The concentrated microalgae will be refined to generate fractions for biostimulants and biopesticides for agriculture or use to feed bivalves, shrimp and zooplankton which can then be used as fish feed. Joining the European Sustainable Phosphorus Platform (ESPP) aligns perfectly with REALM's mission to advance sustainable nutrient management. ESPP provides a unique platform to connect with key stakeholders, share knowledge, and stay at the forefront of nutrient recovery and innovation. Through this collaboration, REALM can strengthen its contribution to sustainable nutrient cycles, enhance visibility within the European bioeconomy sector, and ensure its outcomes align with broader environmental and policy goals.

REALM https://realmalgae.eu/ Horizon Europe project (EU Aquaculture Assistance Mechanism) with 16 partners and associated partners, coordinated by Necton (Companhia Portuguesa de Culturas Marinhas S.A.), Portugal

https://aquaculture.ec.europa.eu/knowledge-base/projects/reusing-effluents-agriculture-unlock-potential-microalgae-realm

Regulatory questions on biomass from waste

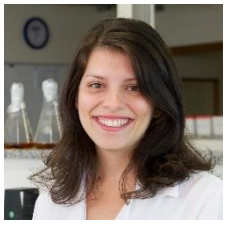
ESPP workshop on legal status of algae & biomass grown in wastes

13th November 2024, with Barry Love, specialist in environmental law, European Commission, stakeholders, and research experts. End-of-Waste, Animal Feed Regulations, Animal By-Product status, EU Fertilising Products Regulation …

ESPP introduced the workshop by underlining that the growth of algae and other biomass is an effective process to purify wastewaters, but raises questions concerning the possible use of the produced algal biomass, both regarding quality and safety (possible contaminants or pathogens) and also legal status: does algae grown in waste or in an animal by-product (such as manure or household food wastes) have waste or animal by-product status ? Also, if Europe wishes to develop algae production for biofuels or materials sustainably, then the algae will need nutrients (including phosphorus), which should be supplied by secondary sources rather than by fertilisers from phosphate rock. And where algae are grown for biofuels or biomaterials, the phosphorus present in algae is not wanted in the final product (e.g. biofuels), so it should be recovered and recycled.

Maris Stulgis, European Commission, DG MARE, underlined that it is important for the industrial development of blue bioeconomy resources to ensure regulatory clarity. The EU's Blue bioeconomy and blue biotechnology actions focus on making better use of resources which are today not well used. Algae production is the most notable developing sector of the blue bioeconomy, with important potential for valorising wastes as input feed materials. The blue bioeconomy also targets other alternative and secondary resources such as jellyfish, sea stars, and fish processing wastes. Improving governance and legislation is a strong objective of the EU's Algae Initiative. In 2022, announced proposes action to fully harness the potential of algae in Europe for healthier diets, lower CO2 emissions, and address water pollution. The European Commission supports networking, information exchange and R&D and the European Algae Stakeholder Platform (EU4Algae) has over 1 000 members. The European Commission has started a major industry study (ends June 2025) into algae potentials, which will include looking at feed for algae production, nutrient recycling and wastewater treatment using algae and uses of resulting produced algae materials, use of 'waste' algae (e.g. beachcast), including market opportunities, legal aspects and safety standards.

Carlos Unamunzaga, European Algae Biomass Association. EABA has around 250 members, around half from industry, provides a platform for dialogue and actively contributes to the development of standards and preparation of regulations. Algae are used in a wide range of applications, to produce ingredients for human and animal food, both nutrients and health additives, pharmaceuticals, cosmetics, biofuels, fertilisers and biostimulants, chemicals, bio-fibres and for CO_2 mitigation, nutrient removal from wastewater and bioremediation. There are no EU regulations specific to algae, and they are covered by a range of legislation such as aquaculture (708/2007 and 1379/2013), novel foods (2283/2015), certified Organic Farming (848/2018), EU Fertilising Products Regulation (1009/2019). The development of EU standards is a key route to ensure coherence, quality, and safety, as both regulatory and market acceptance of algae in different applications.



Marcella Fernandes de Souza, Ghent University, presented two EU-funded R&D projects on algae. SEMPRE-Bio (ongoing) and ALG-AD (finalised) investigate using manure digestates as a sustainable nutrient supply and substrate for algae production. This poses technical challenges in dealing with the viscosity, turbidity and ammonium content of the digestate. Moreover, questions on quality and safety (possible pathogens in produced algae) but also legal challenges are raised: is the produced algae a waste? Or an animal by-product ? And how does this restrict its further end use?

Efthalia Arvaniti, SUBMARINER Network and Sustainable Projects GmbH, presented AlgaeProBanos, an EU-funded project developing algae products in the Baltic – North Sea, for use in textile applications, cosmetics, food products, animal feed and fertiliser biostimulants. The project seeks to use secondary nutrient streams as inputs to microalgae production on land, and integrate nutrient recycling regimes and carbon capture and utilisation (CCU).

Soufiane HSINA, Business Development Manager at Ciments du Maroc (Heidelberg Materials Group), presented their carbon capture project using microalgae to capture CO_2 from the cement plant kiln, as part of HM & CIMAR's sustainability strategy. As a high-energy consumption company, reducing CO_2 emissions has been a long-term goal, including carbon capture technologies for CO_2 sequestration. Ciments Du Maroc, launched a pilot project with its partners in 2018 to use the flue gas from the cement kiln to grow microalgae at the Safi cement plant, one of the largest in Morocco.The project aims to produce around 50 tons of dried microalgae powder per year, eliminating around 80 to 100 tons of CO_2 per year. The facility has been operational since 2021 and managed by a 100% Moroccan team since the end of 2022. They

successfully produce high-quality microalgae powder on a semi-industrial scale, which is marketed under the "ALGACEM" brand for applications such as animal feed additives and biostimulant. To ensure compliance with European and Moroccan standards, a rigorous quality management system is implemented.

Barry Love, specialist in environmental law, Environmental Law Chambers, Glasgow, Scotland, presented and discussed in detail with participants in Brussels and online, the legal analysis commissioned by ESPP on "the Waste/Animal By Product (ABP) status of waste-derived algae with particular reference to the Animal Feeds Regulation". This analysis is summarised below. Three different legal aspects were discussed: waste regulation, animal by-products regulation, use in animal feed.

The EU Waste Framework Directive suggests that European and Member State regulators should ensure that End-of-Waste status is not an obstacle to development of the Circular Economy and to placing on the market of recycled products, in that it states (art. 6) that Member States "shall take" measures to ensure that waste "is considered to have ceased to be waste" if it has undergone recycling or recovery and complies with specified conditions. This is confirmed in the Opinion of the Advocate General to the European Court of Justice (Case C-60/18 AS Tallinna Vesi -v- Keskkonnaamet) where she refers both to the Waste Framework Directive objective to promote waste recovery, but also to the "fundamental rights of the persons concerned … fundamental right of property".

Sewage, wastewaters, digestates and materials derived from these are generally regulated by the Waste Framework Directive, and so by waste / End-of-Waste constraints, but may also be constrained by other regulations, in particular the Animal By-Products Regulations for manure slurries and digestates, dairy and meat industry processing waters, digestates from biowastes (household food waste).

The Animal By-Products (ABP) Regulations create big challenges for recycling. This is because of strict rules in the text and unclear wording, which makes it hard for businesses and investors to get involved.

For example, Article 13 of Regulation 1069/2009 lists only a few ways to dispose of or process Category 2 ABPs (including manure). One option (Art. 13(f)) allows spreading raw manure on land without processing. However, it does not clearly allow spreading separated solid manure, dried manure, manure compost, or digestate - unless these follow the rules in points (d) or (e). These rules cover making organic fertilisers, composting, or biogas production, but they do not clearly mention digestate.

Also, using manure (raw or processed) to grow algae is not mentioned in Article 13, making its legal status uncertain.

Discussions noted:

- Many different authorisations exist for the use of algae grown in 'virgin' substrates. **Algae grown in waste substrates may need new authorisation processes**, based on data showing safety (contaminants, pathogens) and quality.
- Questions were raised as to whether a "**production process**" can have waste as an input. The European Commission FAQ for the Fertilising Products Regulation (Q8.40) suggests that production process cannot use waste as input materials because "waste is used only in recovery operations, and not in a production process".
- It is unclear whether fish excrement is covered by the ABP Regulations. In Regulation 1069/2009, Articles 3.20 and 2.2(k) exclude it from the definition of manure. However, Annex I of Regulation 1774/2002 (which is referenced in Article 3.1 of 1069/2009) does not exclude it. Aquaculture sludge is also not included in the EU Fertilising Products Regulation. Yet, in several countries, it is already used as a fertiliser under national rules—often after processes like solid/liquid separation, drying, composting, or digestion.
- **Washing of algae** grown in wastewaters is important to ensure that the produced algae are not contaminated by residual wastewater.
- The legal analysis for ESPP suggests that **CO2 from offgas, when used to grow algae, is considered a "waste."** This is because offgases are only not seen as waste if they are released into the atmosphere (according to Article 2(a) of the Waste Framework Directive)
- Participants raised questions concerning the authorisation of algal biomass as a fertilising product in **certified Organic Farming**. "Algae and algae products" are authorised as fertilisers under the EU Organic Farming regulations only if "from organic [production] or collected in a sustainable way" and only if processed only by physical processes, water or acid/alkali extraction or fermentation (see 2021/1165, consolidated version, annex II).
- Participants suggested that EU rules should **allow products based on their quality and safety, not based on whether they come from waste or animal by-products (ABP)**. However, the current Waste and ABP regulations do the opposite as they ban any use or recycling unless a specific End-of-Waste or ABP End-Point process is approved.
- This was discussed at the stakeholder workshop on the future EU Circular Economy Act, Brussels & online, 21st January 2025.

"Algae, wastes and the circular economy. Regulatory status of algae and biomass grown using waste or animal by-products", ESPP legal workshop, 13th November 2024, Brussels & online www.phosphorusplatform.eu/legalworkshop Watch replay online here.

Legal Opinion: algae from waste, manure, minerals recycling to animal feed

Lawyer's Opinions for ESPP and EasyMining from Barry Love, Environmental Law Chambers, provide detailed analyses on the legal status of algae grown in wastewater or manure, and of recycled nutrients for animal feeds.

The lawyer's analyses underline that they address only the regulatory aspect, and that health and environment safety and other social aspect must also be addressed.

The analyses note that the wording of **the Waste Framework Directive (WFD 2008/98) fixes as a principle that Member States must enable recycling and recovery** (art. 6 and recitals), and the European Court of Justice has indicated that Member States must ensure that non-decision on End-of-Waste status must not amount to an obstacle to the circular economy (judgement §27 in C-60/18).

The legal analyses discuss the legal definition of and criteria for 'waste' status, 'by-products' and for End-of-Waste, interactions with Animal By-Products regulations (ABP) and ABP End-Points, mixtures of wastes with ABPs, different processing routes and uses for manures, regulatory status of algae or other biomass cultivated in or fed by different wastes (manure, waste waters, food wastes, digestates …) or fed with industrial offgases (e.g. carbon dioxide) and specific restrictions under the Animal Feed regulations and under the Nitrates Directive.

The analyses conclude that **algae grown in wastewaters are 'waste'** (be it untreated or partially treated sewage, digestate, greenhouse wastewater, industry wastewaters …) unless and until they obtain End-of-Waste status. The fact that there is an intended use (e.g. as a fertilising product, or for processing to extract proteins or biofuels) does not modify the fact that algae produced from / in wastewater have regulatory "waste" status. This is similarly true for e.g. sewage sludge incineration ash or (as confirmed in ECJ case C-60/18) stabilised sewage sludge. This is the consequence of the EU Waste Framework Directive definition of waste as something the holder discards, intends to discard or is required to discard: that is, irrespective of whether a subsequent holder of the material considers it to have potential value (e.g. as a secondary raw material or as a recycled fertilising product).

The analyses consider that the situation is different for **crops grown in a field on which sewage sludge is spread**, because in this case the spreading of the sewage sludge can be considered as 'disposal' or 'recovery' or (informal) End-of-Waste under the Waste Framework Directive. On the other hand, **reeds or wood grown in a sewage treatment process** would likely be considered waste (e.g. reeds used for roof thatch wood from willow trees used bioenergy from a structure constructed and managed for sewage treatment for a small settlement, or as polishing downstream of secondary sewage treatment).

Similarly, **algae grown in manure slurry or food wastes are "ABP Derived Products"** as defined by the EU ABP Regulations (manure and separated collected food wastes / biowastes are Cat.2 Animal By-Products = ABP). Therefore, an ABP End-Point would be required before such algae could be marketed without ABP Regulation restrictions.

The above would suggest that, today, algae grown in sewage can be used as a component material under the EU Fertilising Products Regulation (FPR), under the conditions of CMC2 plant materials (this CMC does not exclude waste plant materials, see EU FPR FAQ, Q8.22) whereas algae grown in manure or food waste cannot (because no ABP End-Point has been defined for such use in fertilisers). ESPP suggests that, awkwardly, such ABP-grown algae could still not be used in an EU fertilising product even if the manure/food waste had undergone anaerobic digestion or manure processing conditions to achieve a relevant ABP End-Point, because algae cultivation is not listed as a 'post-processing' method in the FPR.

The analyses also address the **implications of the Animal Feed Regulation** (AFR 767/2009, Annex III), which excludes from use in animal feed:

- wastes from wastewater treatment "irrespective of any further processing": the legal analyses conclude that this exclusion may not exclude nutrients recovered from sewage sludge incineration ash if they obtain End-of-Waste status;
- manures "irrespective of any form of treatment": the Opinions conclude that this exclusion could also be not applicable to nutrients recovered from manure if they obtain End-of-Waste status, since they result from a recovery process, not from manure treatment;
- "solid urban waste": this exclusion is not relevant as it only covers waste in its untreated form, so does not exclude nutrients recovered from processing of such waste.

As regards **nutrients extracted from sewage sludge incineration ash**, the analyses examine the history of this exclusion, and its different wordings, as the Animal Feed regulations evolved from 1991 to today. This analysis suggests that the aim of the current wording is principally to exclude not only biological sewage sludge but also any other waste materials generated during wastewater treatments. This leads to the conclusion that today's wording does not intend to exclude materials which are not wastes and which do not result from the wastewater treatment but from downstream recovery processes.

The analyses note that **if Animal By-Products are incinerated then they cease to be regulated by the ABP regulations and the ash is governed by the Waste Framework Directive** (WFD art. 2(2)b and ABPR 1069/2009 arts. 13 and 14 "disposal").

It is also noted that the **Transmissible Spongiform Encephalopathies (TSE) Regulation 999/2001** specifically bans (Annex VI) feeding to ruminants of dicalcium and tricalcium phosphates "of animal origin". This today appears to exclude any such phosphate recovered from any ABP or ABP ash.

Concerning the **Nitrates Directive**, the analyses note that crops grown after spreading manure, or algae or plants grown in manure slurry should not be considered to be manure "even in a processed form" because the recovered algae are a new and

fundamentally different material from the initial manure. Thus such algae or plants, or recycled nitrogen materials extracted from them, should not be concerned by the manure nitrogen spreading limits of the Nitrates Directive. The analyses suggest the same conclusion for e.g. ammonium salts recovered from offgases of manure storage or treatment.

ESPP comments *that these legal analyses contribute to identifying obstacles and ambiguities in current EU regulation texts which can prevent or hinder nutrient circularity. However, even if these legal analyses suggest that recycling may be legal, companies and investors are unlikely to roll-out recycling technologies whenever there is doubt. Such questions need to be resolved by either modification of the regulatory text, a European Commission written document or by a European Court of Justice decision (this last option being slow and problematic).*

"Legal Opinion on the Waste/Animal By Product (ABP) status of waste-derived algae with particular reference to the Animal Feeds Regulation", Barry Love, Environmental Law Chambers, for ESPP, 4/11/2024 www.phosphorusplatform.eu/regulatory

"Legal Opinion on the use in Animal Feed of inorganic phosphates recovered from sewage sludge incineration ash or from MSW incineration ash", Barry Love, Environmental Law Chambers, for EasyMining, 4/11/2024 www.phosphorusplatform.eu/regulatory

Nutrient recovery

Culterra obtains EU fertilising products CE-mark

Culterra's organic and organo-mineral fertilisers based on secondary raw materials, used in the retail and professional markets (https://www.culterra.com/com/appl.html), are now CE-mark certified and can be sold across Europe. The certification is module D1 certification for both production sites of Culterra, in The Netherlands and in Germany. The company has obtained CE-mark certification by the notified body EFCI under the EU Fertilising Products Regulation (FPR) for its leading organic and organo-mineral fertilisers (PFC 1 A and PFC 1 B), soil -improvers (PFC 3A and PFC 3B) and Blends (PFC 7), using as component materials virgin materials (CMC 1), plant materials (CMC 2), food industry by-products (CMC 6), animal by-products (CMC 10) and industrial by-products (CMC 11). Culterra is also certified ISO-22000, ISO-9001 and Organic Farming input (under 834/2007) "Achieving CE certification underscores our commitment to providing safe, high-quality, and environmentally friendly solutions that fully meet our customers' expectations," says Leon Fock of Culterra.

"Culterra Holland gets CE certification for fertilisers - press release - Culterra sets standard for safety and quality by achieving CE certificate", January 2025 https://www.culterra.com/com/docs/Culterra%20CE%20marking%20-%20Press%20Release.pdf

EasyMining demonstrates iron recovery with Ash2Phos P-recovery process

In tests, over 90% of iron in sewage sludge incineration ash is recovered as high purity ferric chloride, recyclable in wastewater phosphorus, removal. This results in an iron depleted silicon sand. Pilot-scale tests several hundred kg input ash, 20 kg batches) have been carried out since 2022, funded by Re-Source (Sweden government innovation funding), with Feralco (iron coagulant producer) and Sydvatten (Southern Sweden Water company). The tests show that the recovered iron chloride offers quality equivalent to commercial iron coagulants and that the iron-depleted sand, which no longer has the characteristic rust red colour imparted by iron oxide, is compatible with use in concrete in construction. The iron recovery can be operated as an additional add-on to the Ash2Phos process which recovers over 90% of phosphorus in sewage sludge incineration ash (see ESPP Nutrient Recycling Technology Catalogue).

"New process maximises material recovery in water treatment plants", EasyMining (Ragn-Sells group), 16th October 2024.

Canada Biogas Association points to important role of digestate in nutrient recycling

50-page guide on digestate nutrient reuse and recovery from Canada Biogas Association explains the sustainability value of digestate nutrient recycling and presents and evaluates a range of technologies. Canada has nearly 300 biogas plants, processing two million tonnes of manure, crop residues, source separated domestic, commercial and industrial organic wastes. The concentration of livestock production and the linear produce – waste economy removes nutrients from agriculture, leading to a reliance on mineral fertilisers. Reuse and recycling of digestate nutrients contributes to the nutrient circular economy, sustainability and food security. This Guide, published as a supplement to the Canadian Digestate Management Guide, explains different levels of digestate processing and nutrient recycling technologies and provides cascade examples of different technology combinations. Technologies covered include solid-liquid separation (from simple screening or screw presses to flocculation, centrifuges and ultrafiltration), ammonia stripping and recovery, phosphate precipitation, production of organic fertilisers (concentration of liquids, drying of solids). Information given includes separation indices (for water, nitrogen, phosphorus …), output materials and streams, relative operating and capital costs and key benefits.

"Digestate Nutrient Reuse and Recovery Technology Summary", Supplementary materials to the Canadian Digestate Management Guide, May 2024
https://www.biogasassociation.ca/images/uploads/documents/2024/resources/Digestate_Nutrient_Reuse_and_Recovery_Summary_May_2024.pdf

NEWTRIENT 'Solutions Catalog' evaluates over 500 dairy management solutions

Working with farmers cooperatives NEWTRIENT evaluates manure treatment solutions on 9 criteria, including viability, costs and vendor information. The evaluations are published in NEWTRIENT's online catalogue. NEWTRIENT's members include leading US dairy cooperatives representing over 20 000 dairy farmers and half of US milk production as well as dairy industry innovation and trade associations. NEWTRIENT aims are to reduce dairy's environmental footprint, meet nutrient management objectives and enable farmers to meet their business goals. Over 500 solutions are today evaluated including digester systems, composting, bedding management, energy systems, drying, evaporation, ammonia stripping, pyrolysis, additives, screw presses, centrifuges, nitrification-denitrification, ultrafiltration membranes, screens, phosphate precipitation, feed and manure additives, conservation practices, and service providers … NEWTRIENT also publishes regular news items presenting on-farm manure nutrient management implementation success stories.

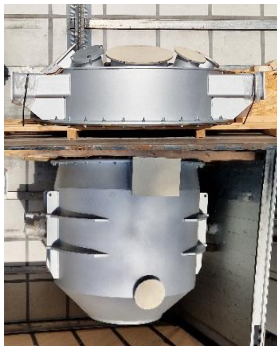
NEWTRIENT www.newtrient.com See also ESPP's SCOPE Newsletter n°125.

ReLEAF questionnaire for farmers on bio-based fertilisers

The ReLEAF project (ESPP member) is conducting a survey to understand farmers' knowledge, preferences, and priorities regarding bio-based fertilisers. The questionnaire is available in seven languages, and will be open until the 20th February 2025. ESPP notes that such surveys have already been carried out by other EU-funded R&D projects, see e.g. Egan et al. in ESPP eNews n°78, Lex4Bio in ESPP eNews 74. A criticism of such surveys is that the answers are voluntary responses, resulting in result bias (mainly persons already informed or motivated will respond).

ReLEAF project questionnaire on farmers' knowledge, preferences, and priorities regarding bio-based fertilisers: https://releafproject.eu/shaping-the-future-of-bio-based-fertilisers-share-your-insights/

Flashphos pilot P_4 recovery pilot starts testing



The EU funded FlashPhos project (ESPP member) will soon start pilot tests for thermochemical recovery of elemental phosphorus (P_4) from dried sewage sludge (250 kg/h), see photos. The process will operate in three stages (project Conceptual Engineering Report D4.1 29/10/2021, page 13): production of dry sludge dust in a dryer-grinder ; flash conversion of dried, ground sewage sludge to produce heat and an intermediate slag ; then reduction of this slag in a refiner with a reducing agent (e.g. coke) to generate P_4 and a final slag. The aim is to valorise this final slag to cement production. Energy to heat the refiner will be provided by electricity. The aim of the project is to demonstrate the process in three pilot units, one for each stage. To date, the dryer-grinder pilot has been built and is operating at a sewage treatment plant. Gasification pre-tests have been performed using a lab tube furnace, 20 cm diameter, 2.5 m high to try out different reaction conditions and evaluate the effect of various additives. Also, synthesised slags intended to be similar to the final process slag have been tested for reactive properties relevant to use to cements. The Flash reactor and Refiner pilots have been constructed and are now nearing completion at ARP GmbH, Leoben, Austria (see photos and drawings), with a capacity of 250 kg/h of dried sewage sludge input. The FlashPhos project includes market and sustainability studies, so the usability of other side products (metal-containing ashes and ferrophos alloy) will be tested. FlashPhos can be seen as follow-up of the EU funded project RecoPhos (2012-2015, see SCOPE Newsletter n°136), in which a small pilot (10 kg/h) inductively heated coke bed reactor was developed and tested at the University of Loeben, Austria, to recover P_4 from sludge ash.

Flashphos (EU Horizon 2020 R&D project, 2021-2026), led by University of Stuttgart, with partners including ESPP member Italmatch: https://flashphos-project.eu

Research

Eutrophication – climate change link

Lakes and reservoirs are estimated to emit greenhouse gases equivalent to around one fifth of fossil fuel emissions. One-page summary of links between eutrophication (caused by nutrient losses) and climate change-driving methane emissions. Methane emissions from all inland waters (also including rivers) are estimated at around one fifth of total global methane emissions and increasing eutrophication is expected to cause these emissions to increase worldwide, maybe to double. At the same time, climate change is expected to accentuate eutrophication. The authors indicate that it is therefore important to reduce nutrient losses from sewage works and from agricultural land, including by nutrient management plans, improved irrigation and cropping, addressing soil erosion and dietary changes (lower meat and dairy consumption would mean less phosphorus losses

from land producing animal feeds). Remediation of eutrophied lakes and rivers would also contribute to reducing methane emissions. Further research is needed to better understand how eutrophication contributes to aquatic methane emissions in different local conditions, and to identify effective mitigation measures.

"A critical eutrophication–climate change link", M. Scholz et al., Nature Sustainability 2025 DOI.

Smart phone fluorescence quantification of inorganic phosphates

Lab tests demonstrate use of a fluorescence-emitting compound with a smartphone camera fluorescence analysis app to measure levels of inorganic phosphates in foods. A specifically designed Samarium (Sm, a lanthanide rare earth element) metal-organic framework compound (MOF) was synthetized, based on H_4DBB (1,3-di(3′,5′-dicarboxylphenyl)benzene). This gave fluorescence of somewhat different colours with soluble inorganic phosphate ions (PO_4^{3-}, $H_2PO_4^-$ and $(PO_3)_6^6$ and showed to be structurally stable, pH stable and water resistant. Synthetic ion solution tests showed that the Sm-DBB enabled rapid measurement of concentrations of these different inorganic phosphate ions and that results were not perturbed by presence of 35 different other ions, including halides, metals, organic ions, different nitrogen ions … Tests with food materials involved crushing three different foods (shrimps, marine fish, bacon), stirring with water, then centrifuging and membrane filtration. The Sm-DBB was mixed into the supernatant for initial tests. In a second stage, Sm-DBB test papers were prepared onto which the supernatant could be dripped and then fluorescence measured using a smartphone app (ColorCollect) under UV light.

"Smartphone-Assisted Fluorescence Determination of Inorganic Phosphorus Using a Samarium Metal−Organic Framework", X. Zhou et al., Inorg. Chem 2025 DOI.

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