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Events and calls for input

ESPC4 and PERM5, Vienna, 20-22 June 2022

The 4th European Sustainable Phosphorus Conference (ESPC4) will be the biggest phosphorus stakeholder meeting globally for 4 years (since ESPC3 Helsinki, with 300 participants from 30 countries, see SCOPE Newsletter n°127).

ESPC4, Monday 20th and Tuesday 21st June 2022, will be followed by **PERM5, the 5th Phosphorus in Europe Research Meeting**, Wednesday 22nd June 2022 (summary of PERM4, June 2021, online, coming soon here).

ESPC4 will include a **Nutrient Recovery Technology Fair**, with stands, presentations and possibility to meet technology suppliers presented in the ESPP-DPP-NNP Catalogue of Nutrient Recovery Technologies, currently being updated (see below).

Deadline for submission of abstracts for ESPC4 is 31st December 2021.

ESPC4 - PERM5 will be both physical and accessible online.
Updated outline programmes of ESPC4 and PERM5, and a call for abstracts for presentations and posters for ESPC4 (open to 31st December 2021) are now online
https://phosphorusplatform.eu/espc4

Phosphates 2022

7 – 9 March 2022, Tampa, Florida. Programme now online. This is "the" phosphate industry professional conference, with over 400 participants. Phosphates 2022 will be in-person (with an online option), and a major chance to re-connect with the phosphate industry, from mining through rock and acid processing, to fertilisers, feed phosphates and technical phosphates.

The two-day conference will have a dual agenda: commercial - market – regulatory, and technical and industry operational.

10% registration discount for ESPP members. Request the code from ESPP

CRU Phosphates 2022:
https://events.crugroup.com/phosphates/home

EU consultations

Consultation on by-products and recovered minerals in EU fertilisers

To 14th January 2022.Two EU public consultations are open on criteria for use under the EU Fertilising Products Regulation of by-products and of recovered minerals, including nitrogen salts from offgas cleaning and ammonia stripping.

This is the outcome of three years' work between the European Commission, industry and stakeholders, with the aim of facilitating the circular economy by allowing use of by-products in fertilisers, whilst ensuring safety and avoiding possible contaminants. Fertilizers Europe published in 2019 an inventory of the many by-products today used in mineral fertiliser production.

ESPP strongly welcomes that CMC15 (2b) will enable inclusion in EU-fertilisers of **recovered nitrogen salts from offgases**, such as ammonium sulphate stripped and recovered from digestates. ESPP considers however that where nitrogen salts are recovered from ammonia from manure storage, manure processing (e.g. digestate) or animal stables, pathogen data is needed to prove sanitary safety and an Animal By-Product End Point should be defined.

ESPP also welcomes that CMC15 (2a) will enable inclusion of e.g. struvite recovered from treatment of discharge from **phosphogypsum waste stacks**.

We note however that CMC11 and CMC15 as proposed are **limited to high-purity inorganic salts and do not cover organic by-products** Some organic by-products are covered under existing CMCs (CMC2 mechanically processed plant materials, CMCS 3-5 composts and digestates, CMC6 certain listed food industry by-products, CMC 14 biochars). Others are not, such as from the pulp & paper industry, biofuels processing, etc. This is because little or no information was submitted on organic by-products by the organic fertiliser industry, resulting in organic materials not being considered.

ESPP's proposed input to the public consultation, as well as various preparatory documents (including the JRC reports) are available at www.phosphorusplatform.eu/regulatory. Comments are welcome on the proposed ESPP input **before the 14th January 2022** submission deadline, and any person or organisation can input directly to the public consultations (below).

Also on this page are ESPP input to the European Commission on the FAQ (**Frequently Asked Questions** = Fertilising Products Regulation guidance document) and ESPP **list of requests for additional new CMCs.** Both these documents are 'ongoing' and are regularly updated, so comments are welcome.

Public consultation pages for CMCs 11 and 15, open to 15th January 2022
https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13113-Fertilisers-high-purity-materials-in-EU-fertilising-products_en
https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/13111-Fertilisers-agronomic-efficiency-and-safety-criteria-for-by-products-in-EU-fertilising-products_en

Fertilising Products Regulation FAQ (Frequently Asked Questions) https://ec.europa.eu/docsroom/documents/46391

Fertilising Products Regulation (FPR) initial regulatory text https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R1009 and adopted amendments: technical progress update 2021/1768 and STRUBIAS materials CMC12 (precipitated phosphates) 2021/2086, CMC13 (ash-derived) 2021/2087 and CMC14 (biochars/pyrolysis/gasification) 2021/2088 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32019R1009

ESPP regulatory activities page www.phosphorusplatform.eu/regulatory

Possible new materials for considerations for EU fertilisers

The European Commission is considering launching assessment of some further materials for possible inclusion into EU fertilising products (new, additional CMCs). ESPP has made input suggesting and documenting the following materials: derivates of mineral by-products (such as waste spent acids), potassium and other salts from (non CMC13) ashes, ammonium salts from fire extinguisher refurbishment, nitrogen recovery from liquid phase of wastewaters, algae and biomass grown using waste inputs (e.g. grown in wastewaters), fish excreta, seafood processing residues, insect frass, separately collected human urine or faeces, vivianite from sewage, paper and pulp industry residues, biofuel processing residues. Further comments and other proposals can be added to ESPP's input: please download the current version here and send comments to ESPP.

ESPP regulatory activities page, see "ESPP proposals for additional new CMCs" under "New EU Fertilising Products Regulation" www.phosphorusplatform.eu/regulatory

Labelling of fertilising products

To 16th February 2022. **The EU public consultation on digitalisation of labelling for chemical products includes an important section on what information should be provided for fertilising products, and how**. The consultation is a general public questionnaire, open also to companies and other organisations, with 29 questions about how digital tools (e.g. QR code linked to online database) could provide information about certain products placed on the market: fertilising products, detergents, paints. General questions address what form of digital tool would be preferred and what level of information. Specific questions on fertilising products ask what information could be moved from the label to online: e.g. information on product function, nutrients content, organic carbon content, storage conditions, risk mitigation measures, low in cadmium, low in chloride, solubility of phosphorus, etc. These questions are posed for fertilisers, liming materials, soil improvers, growing media, inhibitors and biostimulants.

EU consultation "Revision of the EU general pharmaceuticals legislation", open to 16th February 2022. Consultation.

Bathing Water Quality

To 20th January 2022. General public consultation questionnaire on knowledge of, information wished and public policy on bathing waters. Algae are cited as amongst potential concerns about bathing water (Q20) and agricultural run-off (faecal pollution, nutrient surplus, etc.), municipal waste water, eutrophication and proliferation of algae are cited as possible pressures affecting bathing water quality (Q36).

EU consultation "Revision of the EU general pharmaceuticals legislation", open to 20th January 2022. Consultation.

Microplastics: EU call for evidence

To 18th January 2022. **Call for evidence on microplastics unintentionally released into the environment, including capturing at source, and aiming to improve monitoring of microplastics in the environment, drinking water and food**. The call for evidence reminds that the Green Deal fixes the objective to reduce microplastics by 30% by 2030. It emphasises release of microplastics by synthetic textile fibres and from vehicle tires and notes that microplastics will be addressed in the ongoing reviews of the Urban Waste Water Treatment and Sewage Sludge Directives, specifically microplastics in sewage sludge used on fields. Possible approaches proposed in the call for evidence (4 pages) include market incentives to reduce unintentional microplastics releases, knowledge and data gaps, harmonised measurement of microplastics, consumer information, Ecodesign for tires or textiles, capture via green infrastructure, technical solutions to capture microplastics on washing machines or driers, separation of microplastics from sewage sludge.

The call for evidence is a free text field (4000 characters) with the possibility to submit documents.

Call for evidence. "Microplastics pollution – measures to reduce its impact on the environment". Open to 18th January 2022.

Revision of pharmaceuticals legislation

To 21st December 2021. This EU general public consultation questionnaire includes a question (Q13) on emerging environmental challenges from human pharmaceuticals, in which it is possible to add comments (at the end of the questionnaire, under "other") on obstacles posed to nutrient recycling by pharmaceuticals in sewage.

EU consultation "Chemicals – simplification and digitalisation of labelling requirements", open to 21st December 2021. Consultation.

Food "Nutrient Profiles"

To 7th March 2022. This general public consultation concerns consumer information about certain aspects of food only, aiming at healthier eating (energy value, fat, saturates, carbohydrates, sugars, protein, salt, fibre) and also addresses "eat by" dates, origin labelling and information on alcoholic drinks. Phosphorus and minerals such as calcium or magnesium are not addressed. This results from the definition of food "nutrient profiles" in Regulation 1924/2006 on nutrition and health claims made on foods: "nutrient profiles … shall be established taking into account in particular: (a) the quantities of certain nutrients and other substances contained in the food, such as fat, saturated fatty acids, trans-fatty acids, sugars and salt/sodium".

EU consultation "Facilitating healthier food choices – establishing nutrient profiles", open to 7th March 2022. Consultation.

ESPP new members

Sulzer Pumps

New ESPP member, Sulzer Pumps, is a leader in fluid engineering, with products adapted for many sectors, including phosphate and fertiliser production, as well as water treatment. Sulzer engages on innovation and sustainability.

Sulzer is a global leader in fluid engineering. We specialize in pumping, agitation, mixing, separation and purification technologies for fluids of all types. Our customers benefit from our commitment to innovation, performance and quality and from our responsive network of 180 world-class manufacturing facilities and service centres across the globe. Sulzer has been headquartered in Winterthur, Switzerland, since 1834.

Sustainability is engrained in our corporate strategy and embedded in daily business. Starting in 2020, ESG (Environment, Social, Governance) is included in the personal objectives of all our Long-Term-Incentive eligible leaders, shining a spotlight on what our annual employee survey tells us is one of the main societal contributions our people expect from Sulzer.

As an expert in solutions for corrosive and abrasive liquids, or those with high gas content, Sulzer offers specialist pumps, agitators, mixers and compressors for the fertilizer industry. Our products are suitable for the production of phosphate, potash and NPK compound fertilizers as well as acids and industrial chemicals.

Sulzer's extensive portfolio of solutions for pumping, mixing, grinding, aeration and separation processes covers all applications for industrial water treatment. Optimized solutions ensure that your installation provides sustainability and an excellent return on investment. Our water treatment technologies are used at the forefront of a wide range of water intensive industries, such as pulp and paper, food and beverage as well as mining, fertilizers and chemicals.

By joining ESPP, Sulzer Pumps will engage with like-minded organisations that are focussed on innovation and sustainability

www.sulzer.com

NORSØK (Norwegian Centre for Organic Agriculture)

NORSØK provides R&D support to Organic agriculture in Norway, including work on soil fertility, fertilisation, manure management and recycled fertilisers, in particular using residuals from the seafood industry.

The Norwegian Centre for Organic Agriculture (NORSØK) was established in 1986, as a private foundation and research institute to conduct research and development activities to support the development of Organic production in Norway. From 1996 to 2005 NORSØK was part of Bioforsk (which is now NIBIO). Today, 25 people work at NORSØK, located at Tingvoll better reference https://en.wikipedia.org/wiki/Tingvoll , close to Trondheim in a region agriculturally dominated by dairy farming, but where aquaculture and fishery are much larger industries. NIBIO (formerly Bioforsk) also has a department at Tingvoll, and NORSØK and NIBIO collaborate closely. Soil fertility and the fertilisation of crop plants is a major research topic for Organic Farming, and since 2012, NORSØK is working on recycled fertilisers and soil improvers. We have tested struvite from Norwegian sewage, sediments from hydrolysed slaughter waste, and marble mining residues. More recently, several projects have been carried out with residual materials from marine industries. Fishbones are a rich source of N, Ca and P, and seaweed is a rapidly emerging industry which may complete fish residues in K, S, etc. NORSØK also works with animal farming systems and on management of animal manure e.g., manure storage gas emissions, soil organic matter dynamics and soil health. NORSØK (and NIBIO Tingvoll) are located on an Organic dairy farm, and soil characteristics, such as the P concentrations, are monitored since 1994. NORSØK has followed ESPP activities over several years, since we participated in the CORE Organic project "Improve P", assessing how more recycled fertilisers could be applied in Organic agriculture. With several current projects on recycled fertilisers, it is now a time to become an ESPP member, says NORSØK director, Ms. Turid Strøm.

https://www.norsok.no/en/

EU policy

European Commission Work Programme

The Commission's Work Programme for 2022 cites as priorities, within the Green Deal, water policy, zero pollution, arm-to fork and the circular economy. Listed regulatory initiatives already underway include: Revision (REFIT) of the Urban Wastewater Treatment Directive, Revised lists of water pollutants (Zero Pollution Action Plan), Bio-based, biodegradable and compostable plastics, Restrictions on micro-plastics and their release in the environment, Development of "National Strategic Plans that deliver on the objectives of the Common Agricultural Policy and the Green Deal", Finalisation of the Carbon Border Adjustment Mechanism.

European Commission Work Programme for 2022, 19th October 2021, COM(2021)645 HERE.

Stakeholder call on food chain safety and Circular Economy

The European Food Safety Agency (EFSA) is calling for stakeholders to identify emerging risks and vulnerabilities for the food chain and for animal feed related to the Circular Economy. This is within a two-year study underway 2021-2022. Stakeholders will be able to engage in this project through workshops and consultation, contribute to identifying issues, risks and knowledge gaps and possible policy needs. The study objectives include defining principles and make recommendations to ensure coherence between environment and human food and animal feed safety.

EFSA call for stakeholders (not dated) HERE.
EFSA workshop on 'Food and Feed Safety Vulnerabilities in Circular Economy', 29th October 2021: HERE.

Arcadis report on risks of contaminants in fertilisers

The EU has published a report on possible risks of cadmium, chromium, vanadium, mercury, diclofenac, PFAS, dioxins and fluoride in mineral, organic and recycled fertilisers, under EU or national regulation. The report was commissioned by DG Environment and aimed to assess all possible contaminants in fertilisers (mineral, organic, organo-mineral, but not covering liming materials, soil improvers, nor fertilising products not placed on the market, such as manure or sewage sludge).

The report estimates that P and N use in fertilisers in the EU fell by respectively -66% and -24% from 1980 to 2015, to 8.6 kgP/ha and 77 kgN/ha. Organic fertilisers are estimated at only around 5% of fertiliser nutrient markets.

After consideration of a range of contaminants, the eight indicated above were prioritised for assessment and the following findings and recommendations are presented:

No risks were identified for chromium, mercury or vanadium, based on levels found in some mineral fertilisers and/or maximum levels authorised under the Fertilising Products Regulation 'STRUBIAS' criteria for ashes (CMC13). However, for vanadium, the report indicates that the risk assessment scenario (worst case) would lead to a rapid accumulation in soils (x10 in 10 years).

Fluoride is considered "low risk". The report suggests that use of mineral fertilisers could lead to a doubling of soil fluorine levels by 100 years, with possible risks for grazing animals. No concern for human intake is identified.

Diclofenac is considered "low risk". This is an organochlorine drug used as anti-inflammatory and pain-killer. Even assuming 1 – 10% transfer from sewage sludge to precipitated phosphates or biochars, "the contribution of recycled fertilisers to the total input of diclofenac to agriculture soil is likely to be negligible". Monitoring of manure is however recommended (diclofenac is used in livestock, but calls have been made for it to be banned because its presence in carcasses is known to kill vultures).

For dioxins (PCDD/F), the EU Fertilising Products Regulation 'STRUBIAS' limit for ash used in production of ash-derived recovered fertilisers (CMC13) and for biochars (CMC14) was considered for risk assessment (20 ng WHO tox.eq. / kg dm). It is not taken into account that in the CMC13 criteria this limit applies to the raw ash, not to the fertilising product derived from it, which in many cases will be purified. Using this 'worst case' level, it is noted that the main source of PCDD/F is atmospheric deposition. Nonetheless possible risk is identified for humans via food. Therefore, it is recommended to reduce the 20 ng $WHO_{tox.equiv.}$ limit currently set by CMC13 and to apply this limit to all fertilisers, presumably meaning also ashes, ash derived fertilisers or biochars used under national fertilisers regulations.

For cadmium, the report states that calculations suggest a risk for soils after 100 years of application of mineral fertilisers with 60 mgCd/kgP_2O_5 (that is the limit currently fixed in the EU Fertilising Products Regulation) but no risk at 20 mgCd/kgP_2O_5. The report also suggests possible risk for humans from cadmium in food, in case of high intakes of vegetables. These results assume an annual application rate of 100 kgP_2O_5/ha/year, based on secondary data for fertiliser use in areas with low soil P, whereas it seems incoherent to consider that such a level would be applied for 100 years. The report underlines high levels of uncertainty, in particular concerning fate of cadmium in soils and transfer to crops, and wide regional variation depending on background soil cadmium levels. Also, it is noted that the report does not take into account the alternative leaching model of Smolders et al. (summarised in ESPP eNews n°27 2018) for which it is stated "*It is highly recommended to take into account their findings to further finetune the above assessment, as the accumulation over time has likely been overestimated*."

For PFAS, an assessment was made based on a "hypothetical" 100 µg/kg dw of PFOA and of PFHxA in recovered fertilisers (e.g. precipitated phosphates or ash-derived). This number was taken from Austrian fertiliser regulations (0.1 mg/kg limit for PFOA + PFHxA) and not on any data. It is noted that the main sources to the environment are sewage sludge biosolids, composts, irrigation water and atmospheric deposition, not recycled fertilisers (even with this hypothetical level). The report therefore recommends to "remove PFAS as completely as possible from fertilising materials". ESPP supports this and suggests that the best way to achieve this is to implement the proposed PFAS ban announced in the EU Chemical Strategy 2020 and in the Commission working document SWD(2020)249.

The report also considers **pyrazoles** (in particular **3-methylpyrazole**) which are used as nitrification inhibitors in nitrogen fertilisers, concluding that there may be possible risk from 3-M to soil organisms, related to the substance's slow degradation in soil, and that further data collection should be made.

DG Environment has underlined that this report is not a "risk assessment" for fertilisers, nor for the eight substances assessed, but rather a screening exercise, intended to identify for which contaminants and for which uses further data collection and risk assessment should be carried out, prior to possible action under REACH (European Chemicals Regulation) to possibly ban or limit levels of these substances, if appropriate, in all fertilisers in Europe (both EU and national fertilisers).

"Contaminants in fertilisers: Assessment of the risks from their presence and socio-economic impacts of a possible restriction under REACH", ARCADIS, Arcadia, Vander Straeten, DHI, for the European Commission DG Environment, Final Report under contract 070201/2019/817112/SER/ENV.B2, July 2021 https://ec.europa.eu/environment/chemicals/reach/pdf/20210726-FInal%20report-V2c.pdf
This follows on from the strongly criticised "AMEC" report on contaminants in composts and digestates published by DG Environment in 2019, see www.phosphorusplatform.eu/eNews041

EFSA Opinion on (certain) Animal By-Products (ABPs) and EU-fertilising products

This is supposed to be the first step towards including in the European Fertilising Products Regulation a number of ABP Derived Products which are already widely used across Europe. However, the EFSA document (111 pages) does not seem, in ESPP's view, to be positive for some materials; and other materials are still not yet addressed.

ESPP underlines that today **the materials considered in this EFSA Opinion are already "*widely used in the EU as fertilisers and soil improvers*".** This is stated in the FPR art. 46(1)). The difference between current use (under national fertilisers regulations), and possible use under the EU FPR, is that at present the materials are authorised for use but only with "traceability" (products containing such ABP Derived Products sold under national fertiliser legislation must be distributed with a system of traceability for the ABP Derived Products). If authorised as EU fertilising products, the materials would be free to move on the EU market with no traceability

FPR implementation and the EFSA Opinion

To enable use of ABP Derived Products in EU-fertilisers, Council and Parliament specified in art. 46 of the FPR (modifying art. 5 of the ABP Regulation 1069/2009) that before 15th January 2020, the European Commission should "*initiate a first assessment*" of certain listed ABP Derived Products (see table below). Three and a half months after this deadline, on 30th April 2020, DG SANTE transmitted to EFSA an initial mandate 2020-0088 requesting a scientific Opinion on these listed materials. However, following modifications to this mandate made by DG SANTE, the EFSA Opinion in fact only covers some, and not all, of the listed materials (see table below).

The EFSA Opinion was adopted 20th October 2021 and published December 2021.

In order for the ABP Derived Products concerned by this Opinion to be used in EU-fertilisers and placed on the market without restrictions from the ABP Regulation, **DG SANTE must now prepare and enact amendments to the ABP Regulation** 1069/2009 defining an appropriate "End-Point" (for use as an EU fertilising product) for each material.

EFSA has underlined to ESPP that EFSA did not conduct a risk assessment of the use of these materials as fertilisers, and that the EFSA document does not constitute an opinion on the "safety" of these materials used as fertilisers. Indeed, the European Commission DG SANTE mandate to EFSA requested a scientific opinion on whether certain specified treatment processes for certain materials would reduce (by specified levels) certain types of pathogens. The EFSA Opinion states that "*as a result of the … request from the European Commission the output … was not a full risk assessment, but consisted of the estimation of the level of inactivation / reduction of concentration of biological hazards …*". Thus, the EFSA Opinion indicates only with what % certainty the experts consider that the processes already specified in the ABP Regulation annexes, for each material, are able to reduce selected indicator microorganisms to a certain level. For example, for "Pig Bristles", EFSA concludes that it is only 33% - 66% likely that heating for 5 minutes at 100°C will achieve the specified reduction of the most resistant of the indicator microorganisms considered (the experts are 50% - 95% certain if 100°c is applied for 60 minutes).

ESPP notes that these conclusions raise questions given that the materials concerned are today widely used in national fertilising products across Europe, and have been for many years.

Regulatory wording:

Animal By-Products themselves, that is without treatment or processing, cannot be included into EU fertilising Products, only Derived Products (by FPR recital (18) and wording of CMC10).

A "Derived Product" is defined in the Animal By-Products Regulation 1069/2009 art.3.2 as a product obtained from an ABP by any process or treatment.

Art. 46 of the EU Fertilising Products Regulation (FPR), modifying art. 5 of the ABP Regulation 1069/2009, states that for "Derived Products" referred in articles 32, 35 and 36 (of 1069/2009), an "End-Point" may be determined (by European Commission DG SANTE decision, i.e. a delegated act modifying Regulation 1069/2009). The End-Point should be such that the Derived Products "*no longer pose significant risk*" and are no longer subject to ABP Regulation controls. Derived Products having reached the End Point may be placed on the market without restrictions and are no longer subject to ABP Regulation controls.

It is ESPP's view that together, art. 36 of 1069/2009 ("*other*" Derived Products), with art. 46 of the FPR, effectively mean that any ABP Derived Product (from Cat. 1, 2 or 3 ABPs) could in the future be included into EU fertilising products, subject to defining an End-Point (processing and materials criteria) which ensures safe sourcing and/or safe treatment as defined in 1069/2009 arts. 27 and 38.

This published EFSA Opinion, however, addresses only Cat.2 and 3 ABPs and Derived Products because this was requested by DG SANTE and corresponds to the "first assessment" specified in FPR art. 46.4.

ESPP notes that art. 46 of the FPR instructs the Commission to assess Derived Products "referred to" in art. 32 of the ABP Regulation 1069/2009 (this article is confusingly titled "Organic fertilisers and soil improvers", but in fact also covers inorganic materials such as ashes). The EFSA Opinion however addresses ABPs/Derived products "used as organic fertilisers and/or soil improvers".

EFSA conclusions (simplified summary by ESPP)

Composts and digestates, where manure (and/or other Cat. 3 or Cat. 2 ABPs) are inputs, and also (discards of) **pet food, feed and dog chews**, were not assessed by EFSA, following modification of the mandate by DG SANTE. This is despite their being listed in art. 46(1)4 of the FPR Regulation.

For ashes, the EFSA Opinion indicates 99-100% certainty that the specified processes ensure the specified levels of pathogen reduction for Cat.2 and Cat.3 ABPs. EFSA indicates that Cat.1 ABPs were excluded from the assessment, and the pathogens considered by EFSA do not include prions.

For the other ABP materials assessed by EFSA the level of scientific certainty is lower, ranging from 1% - 33% to 98% - 100%, for different materials and for different microorganisms.

What next?

Given the slow progress on this dossier, ESPP fears that it today looks unlikely that any Animal By-Product Derived Products will be eligible for inclusion in or processing into EU fertilising products when the FPR enters into application in July 2022, even for those materials explicitly cited by in art. 46(1) of the FPR (c.f. CMC10), even for the materials covered in the ESFA Opinion for which the conclusion seems positive, and even for materials which are today widely used under national fertilisers regulations, and have been for many years.

For certain other materials which were not specified in the FPR art. 46(1), it may be appropriate that either the European Commission and/or industry should now request an Opinion from EFSA, to enable progress towards inclusion into the FPR and/or to ensure farmer and consumer confidence in safety: **biochars / pyrolysis materials** (with manure or other ABPs as inputs), **nitrogen salts recovered from offgases** of manure storage, manure processing or livestock stables, **Cat.1 ABP ashes**.

EFSA Opinion of 30th October 2021 "Inactivation of indicator microorganisms and biological hazards by standard and/or alternative processing methods in Category 2 and 3 animal by-products and derived products to be used as organic fertilisers and/or soil improvers" https://www.efsa.europa.eu/en/efsajournal/pub/6932 and https://doi.org/10.2903/j.efsa.2021.6932

Animal By-Products Derived Products: these cannot be "used" under the EU Fertilising Products Regulation 2019/1009 unless and until an End-Point is added to the ABP Regulation 1069/2009:

Material	**Cited in FPR art. 46(1)**	**Relevant CMC**	**Conclusions of EFSA Opinion 20/10/21 ***
Meat meal	YES	ABP Derived Products as specified in the EU Fertilising Products Regulation **CMC10.** CMC10 is currently an "empty box" pending the inclusion of ABP materials to be defined**.**	Not addressed
Bone meal	YES		Not addressed
Meat and bone meal	YES		Not addressed
Hydrolysed Cat.3 proteins	YES		Not addressed
Processed manure	YES		Not addressed
Feather meal	YES		Not addressed
Glycerine and other materials from production of biofuels and renewable fuels (for the specific processes considered)	YES		90% - 100% for Cat.2 66% - 99% for Cat.3
Petfood, feed and dog chews	YES		Not addressed
Blood	YES		Not addressed
Hides and skins **	YES		10% – 66%
Pig bristles ** (after treatment for 5 / 60 minutes)	YES		33% - 66% / 50% - 95%
Hoofs and horns **	YES		66% - 95%
Feathers and down **			66% - 90%
Wool and hair **	YES		1% - 50%
Bird and bat guano	YES		Not addressed
Precipitated phosphates [and derivates] from manure and/or ABPs	No	CMC12	
Biochar / pyrolysis materials [and derivates] from manure and/or ABPs	No	CMC14	
Cats. 2 & 3 ABP incineration ash [and derivates]	No	CMC13	99% – 100%
Cat. 1 ABP incineration ash [and derivates]	No	Currently excluded from FPR CMC13	
Compost	YES	CMC3	Not addressed
Digestate	YES	CMC5	
Nitrogen recovered from manure processing offgas or from livestock stable offgas	No	Proposed in CMC15	
* the % indicated is the degree of scientific certainty that, for the material, the specified processes will achieve the required reduction of levels of the most resistant of the specified pathogens. When multiple processes for the same material have been assessed, the % range covers the lowest and the highest % for any of these.			
** art. 46(1)4 refers to "derived products from blood of animals, hides and skins, hoof and hors, guano of bats and birds, wool and hair feather and downs, and pig bristles". EFSA has however indicated that DG SANTE did not request an assessment of 'derived products' from these materials, but only of the materials themselves. See discussion above			

ESPP activities

Webinar: regulatory questions around manure recycling

This ESPP event attracted over 500 participants online (nearly 700 registrations). ESPP's slides, providing a number of reference information links, and the edited 'Chat' with added comments and answers to questions, are now published. The webinar was an opportunity for discussion and asking questions, and the recording is made available to participants only, however the documents online (slides, edited 'chat') provide information about recycling into animal feed, EU Fertilising Products Regulation (status of manure, consequences of post-processing composts or digestates), pyrolysis./ biochar materials, ammonia recovery from manure, etc.

ESPP webinar on regulatory challenges around manure recycling, 24th November 2021: LINK.

ESPP input to EFSA on Circular Economy

ESPP has input to the European Food Safety Agency EFSA's study into circularity and human food and animal feed safety. ESPP underlines the potential for nutrient recycling to the food chain, in fertilisers or animal feed, and the need to both ensure full safety (and public confidence in this safety) and at the same time address regulatory obstacles to nutrient recycling. ESPP suggests to establish an "EU food chain circular economy info point" to advise developers and producers of circular economy materials, who are often from outside the food and feed industry, and have difficulty understanding the specific regulations applicable in these sectors. ESPP suggests that the EFSA study should consider the circularity and safety issues of recycled materials in fertilisers and processing of secondary materials before use in fertilisers, feed or foods: extraction of specific substances from secondary materials, use of waste streams to feed algae or microbial protein production, chemical re-processing of wastes to mineral nutrients. A detailed annex to the letter lists a number of regulatory obstacles identified at present to nutrient recycling which are relevant to EFSA.

ESPP letter to EFSA 10_12_2021 on ESPP's "regulatory" web page www.phosphorusplatform.eu/regulatory
EFSA call (open) for stakeholder input (information, engagement …) on "Food and feed safety vulnerabilities in a circular economy" HERE

Factsheets on recycling from wastewater: algae, minerals, fibres & polymers

Eureau, with support from a group of stakeholders including ESPP, has published three factsheets outlining the need for EU End-of-Waste criteria and the market potential for materials which can be recovered from wastewater: algae biomass, fibres polymers and other organics, mineral chemicals**.** The three fact sheets cover non-fertiliser applications, in that the process for obtaining EU End-of-Waste status for fertiliser uses is the EU Fertilising Products Regulation. The fact sheets aim to show EU regulators why End-of-Waste criteria are needed for these materials, and the potential markets which could be unlocked, and more widely to foster dialogue on resource recovery from wastewater. After consultation by LEAF of over 100 stakeholders, the fact sheets estimate that up to 210 000 t/y (DM) algae could be produced using wastewater nutrients, 100 000 t/y of cellulose and bioplastics could be recovered/produced, and 65 000 tP/y and 75 000 tN/y in recovered mineral salt chemicals.

Eureau – resources – news "Valuing our recyclable materials", 1st December 2021

European Commission answer on End-of-Waste for materials from wastewater

The European Commission has answered a Parliamentary Question by MEP Jan Huitema on recycling from wastewaters, suggesting future mandatory recycling content requirements and Green Public Purchasing.: Mr Huitema's question asked whether the Commission would prioritise materials recovered from sewage for the definition of EU End-of-Waste Criteria (see ESPP eNews n°59) and what actions were envisaged to bolster the market for recycled materials The answer from the European Commissioner for the Environment, Virginijus Sinkevičius, reminds that EU End-of-Waste criteria are provided for precipitated phosphates (CMC12), ash-derived materials (CMC13) and gas-recovered nitrogen salts (CMC15 pending) under the EU Fertilising Products Regulation. He indicates that streams prioritised for definition of EU End-of-Waste criteria will be defined by end 2021 (ESPP note: the Commission suggested however at the stakeholder workshop of 14-15 September that probably only one material would be looked at in 2022, out of all possible waste streams). Mr Sinkevičius also states that, under the Circular Economy Action Plan, the Commission will "enhance the role of standardisation, … develop mandatory recycled content requirements and facilitate the uptake of products containing recycled content through mandatory green public procurement rules".

Jan Huitema, European Parliamentary Questions, 2 September 2021 (E-004040/2021) and answer from Virginijus Sinkevičius HERE.

Algae grown in wastewater

ESPP, Eureau and EABA letter have wet a formal letter to the European Commission asking for clarification of the regulatory status of algae and biomass grown in wastewater, or using other secondary material inputs. Such algae production uses 'waste' as an input, but it is unclear whether the resulting biomass itself a 'waste'? Is End-of-Waste status relevant? Consequently, can materials extracted from such waste-fed biomass be used under CMC1 of the EU Fertilising Products Regulation ? Production of algae or other biomass can be highly effective in treatment of and nutrient removal from wastewaters, or in treating offgases, enabling valorisation of secondary nutrients and trapping of carbon dioxide.

ESPP – Eurea – EABA letter 17_11_2021 at ESPP regulatory activities page www.phosphorusplatform.eu/regulatory

Nutrient recycling

STOWA report on nitrogen recovery perspectives

Long-term, most sewage works influent N could be recovered, covering half of mineral fertiliser N use. Short term, stripping from sewage sludge digestate could represent one fifth of this potential (10% of fertiliser use). The long-term refers to a scenario with redesign of sewage works as circular water centres. The report by STOWA, the Netherlands water boards' joint research foundation, is based on a survey and interviews: 9 replies to 30 questionnaires sent to nitrogen industry operators, interviews of experts and companies. STOWA estimate sewage in the Netherlands (influent to the water boards' treatment works) contains around 84 ktN, of which at present 66% is emitted to air, 15% to effluent and 19% remains in sewage sludge. The report analyses four N-recovery technologies based on:

- Stripping of ammonia from sewage sludge digestate (centrate) and recovery of ammonium salts (scrubbing): AMFER, GMB BioEnergie, Detricon, Nijhuis, Yara, Circular Values BV, Eawag. Operating at industrial or pilot stage.
- Membrane stripping (use of a gas-permeable membrane to improve the stripping as above, ammonium salts or ammonia solution can be recovered): Powerstep (Eawag, Artemis, Sustec). Operating at full-scale pilot stage.
- Bipolar membrane electrodialysis (similar to membrane stripping, but with combination with electrodialysis improves ammonia separation): TU Delft, Newbies (W&F, Wetsus, ICRA, Evides). R&D pilot stage only.
- Ion exchange (adsorption of ammonia from solution by an ion exchange resin or using zeolite, then regeneration to recover an acidic solution of ammonium salts): SVB Sluisjesdick, Necovery, Waterfabriek. R&D pilot stage only.

The report identifies challenges to N-recovery from sewage, in particular possible contaminants in the recovered product, logistics and marketing of recovered product, legislative obstacles (waste status of recovered N, need for authorisation as a fertiliser under national and/or EU Fertilising Products Regulation) and cost, but considers that increasing natural gas prices could make recovered N increasingly competitive compared to Haber-Bosch N (synthetic mineral N fertilisers). However, there are opportunities in the Netherlands water boards' objective of "full circularity" by 2050 and the advantages of N-recovery in reducing N_2O emissions in the sewage plant and avoiding CO_2 emissions in production of synthetic N fertiliser.

"Stikstofterugwinning uit rioolwater; van marktambitie naar praktijk" (Nitrogen recovery from sewage; from market ambition to practice), STOWA report 2021-35 (12th October 2021, 104 pages, in Dutch) https://www.stowa.nl/publicaties/stikstofterugwinning-uit-rioolwater-van-marktambitie-naar-praktijk

Zero P fertilisation does not impact crop productivity in very high P soils

Different crops were tested with zero P fertiliser in Flanders at sites with very high initial soil P. No loss in crop yield was seen after four years compared to organic plus mineral fertiliser applied to local limits. Trial plots were at 2 sites, on a total of 14 ha. Initial soil P was 380 – 470 P-AL (ammonium lactate extractable), PSD (Phosphorus Saturation Degree) 29 – 34. Zero P-fertilisation reduced the field P balance, but had no measurable effect on soil phosphorus stocks after four years: soil P-AL dropped slightly in both P-fertilised and zero P-fertiliser plots, whereas PSD increased slightly or was unchanged, again with P-fertilisation making no apparent difference. Soil organic carbon levels also showed no changes related to the fertilisation regime. Unsurprisingly, given the absence of impact on soil P levels and the initial high soil P, crop yields were also non significantly modified by the four years of zero P fertilisation. The authors note that ryegrass, silage maize, celeriac and Chinese cabbage removed more P than other crops tested (potato, leek, fennel, lettuce, endive). This study shows that if soil P levels are high, then crop yields can be maintained for several years without P-fertiliser application. The study does not indicate how the soil P levels at the test sites compare agronomic soil P index recommendations.

"Soil phosphorus (P) mining in agriculture – Impacts on P availability, crop yields and soil organic carbon stocks", S. Vandermoere et al., Agriculture, Ecosystems and Environment 322 (2021) 107660 DOI.

Manure, Nitrates Directive and surplus phosphorus

Based on pig and poultry numbers and feed data, application of manure to Nitrates Directive N-limits can result in P inputs many times higher than estimated crop offtake, and so, depending on soil P status, P-losses to surface waters. Pig meat is the largest source of animal protein in Europe, with nearly 250 million pigs slaughtered annually. Europe also slaughtered 7 000 million poultry (broilers) and counted nearly 370 million egg-laying hens. The authors present data on pig and poultry livestock numbers and P/N ratios in manure, topsoil phosphorus levels across Europe. Because poultry and pigs are monogastric (like humans), they cannot digestate phytate, the principal form in which phosphorus is stored in plants, P/N ratios in manure generally lead to surplus P application, even where manure application is limited under the EU Nitrates Directive (170 kgN/ha from manure and processed manure). The authors note that phosphorus storage can result in loss of up to half of manure nitrogen, as ammonia or nitrogen gases, so leading to N/P ratios down to around 2. Excess P applied to soil in manure may initially accumulate in soil, leading to increased soil P levels. P losses to surface waters will depend on manure application and manure N/P ratios, but also on crop offtake and on soil P status. The authors conclude that measures are needed to improve livestock P and N use efficiency, to improve manure management, to reduce N losses to the atmosphere and reduce soil P accumulation and P losses to surface waters. Such measures can include manure acidification, ammonia stripping/recovery, drying and pelletising and P-removal/recovery.

"Phosphorus Flows, Surpluses, and N/P Agronomic Balancing When Using Manure from Pig and Poultry Farms", A. Rosemarin, N. Ekane & K. Andersson, Agronomy 2021, 11, 2228 DOI.

Literature data review: removal of contaminant metals in thermal sludge treatment

Data from 37 publications is analysed on how heavy metal vaporisation (and so removal) during sewage sludge incineration is impacted by different chlorine additives, temperature, treatment conditions and type of sludge. Chlorine donors used in the identified studies are magnesium, calcium, sodium, potassium, aluminium and iron chloride, hydrochloric acid and PVC. Process temperatures ranged from 300°C to 1200°C, residence time from 1.5 to 1400 minutes, combustion conditions from incineration to pyrolysis and input material from wet sewage sludge to sludge incineration ash. Consequently, heavy metal removal rates varied very widely, from 0 – 99% for cadmium, 10 – 99% for lead, 0 – 80% for copper and zinc, 0-75% for chromium, 0 – 60% for nickel and arsenic. Higher temperatures, above 800°C – 900°C, generally achieved high levels of removal of cadmium, lead and copper, but lower removal of zinc, arsenic, chromium and nickel. Nickel and chromium show as particularly difficult to remove by vaporisation. The wide variation of removal rates shows the potential for improving heavy metal removal by specifically adapting pyrolysis or incineration process design and management, and the paper provides a useful source of overview data and references.

"Trace metal elements vaporization and phosphorus recovery during sewage sludge thermochemical treatment – A review", B. Galey, M. Gautier, et al., J. Hazardous Materials 424 (2022) 127360 DOI.

Scenarios for P-recycling in Switzerland

A study, with Cantons and operators of North West Switzerland, of options for P-recovery from sewage suggest decisions are difficult to take today because of lack of agreement on cost-sharing between operators.

The study, led by FHNW within the Phos4You Interreg project, from 2019 to 2021, considered the four Cantons around Basel, Argovia and Solothurn, population 1.5 million (17% of Swiss population). Currently, the four Cantons produce c. 43 000 tDM/y sewage sludge, of which c. 63% goes to sewage sludge (mono)incineration plants, 25% to cement works and 12% to municipal refuse incinerators. The region has spare disposal capacity and imports sludge from other regions (the region currently disposes of 38% of total Swiss sewage sludge). Over the coming 10-15 years, all the sludge incineration plants of the four Cantons are expected to be decommissioned, so providing the opportunity to either build new mono-incineration capacity or other technologies, and to integrate the P-recovery system into the new plants, depending on the scenario chosen.

A number of scenarios were considered based on nine technologies:

- P-recovery from sewage sludge (mono)incineration ash (SSIA) by acid attack and purification: EcoPhos (now Prayon)*, Parforce*, Phos4Life**, REALphos. The ash could either be treated in Switzerland or exported to an operator elsewhere in Europe.
- Mixed incineration of sewage sludge and meat and bone meal, then reaction with phosphoric or other acid, resulting in dilution of contaminants and increased plant P availability: ZAB/Phos4Green (Glatt)**.
- Modified incineration processes where specific reactor conditions and additives remove some heavy metals and improve the plant availability of the P in the resulting ash. EuPhoRe**, Pyrophos,
- Enhanced struvite recovery from the sewage sludge (i.e. after biological or chemical processing to release P) then incineration of the P-depleted sludge in (existing) cement works: PhosForce**, Stuttgart.
- "Wait and see", where current sludge disposal routes are continued and investment decisions are postponed (2026 is deadline fixed by the Swiss P-recovery obligation) in order to have better information and avoid risks resulting from being first movers.

The six main operators in sewage sludge disposal today (ARA Rhein, ProRheno, Erzo, STRAG, ZAR/ KEBAG, Geocycle/Holcim) and the four Cantons participated in workshops and validated the conclusions.

The information available today resulted in variations for most criteria assessed between technology suppliers for the same scenario. No scenario performs overall "better" than the others, preference depends on different operators' relative weighting of criteria for cost, environmental performance, future robustness and disposal safety. Challenges identified include lack of full-scale operating experience to support estimates of technology investment and operating costs, need for reliable long-term contracts with technology suppliers especially if ash is exported for treatment outside Switzerland, difficulty to reliably recover sufficient phosphorus for technologies aiming to recover from sludge given that the recovery target in Switzerland may be raised in the future from 50% to 75% (rather than recovery after mono-incineration), difficulty to obtain meat and bone meal ash for technologies planning to use this input in their process (to achieve Swiss fertiliser requirements which are stricter than those of the new EU Fertilising Products Regulation).

The median total net additional cost for P-recovery (compared to sludge disposal without P-recovery) across the different scenarios and technologies is estimated at c. 110 CHF/t dewatered sludge, that is 1.4 €/year per inhabitant.

*** and *: see ESPP-DPP-NNP Nutrient Recovery Technology Catalogue (** = TRL6+, * = R&D)*
Summary of Swiss P-recovery obligation and Swiss quality requirements for recovered fertilisers: www.phosphorusplatform.eu/Scope129
Ful report in German: https://pxch.ch/uploads/1/1/1/7/111701981/pnws.pdf
Inventory of Swiss incineration plants in German: https://pxch.ch/uploads/1/1/1/7/111701981/inventur_der_schweizer_kva_v2.pdf
Inventory of Swiss sludge drying plants in German: https://pxch.ch/uploads/1/1/1/7/111701981/inventar_kstrocknung.pdf

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